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STATE BOARD OF HEALTH
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STATE OF WISCONSIN.

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MEMBERS.

PRESIDENT,	
E. L. GRIFFIN, M. D., - -	Fond du Lac.
SECRETARY,	
J. T. REEVE, M. D., - - -	Appleton.
JOHN FAVILL, M. D., - -	Madison.
SOLON MARKS, M. D., - -	Milwaukee.
Gen. JAMES BINTLIFF, -	Darlington.
H. P. STRONG, M. D., - -	Beloit.
G. F. WITTER, M. D., - -	Grand Rapids.

GENERAL REPORT OF THE BOARD.

STATE OF WISCONSIN,
OFFICE OF THE STATE BOARD OF HEALTH,
October 31, 1879.

To His Excellency, WILLIAM E. SMITH,
Governor of Wisconsin:

SIR: In accordance with the provisions of the statute, we present you herewith the fourth annual report of the State Board of Health. For such details of the methods pursued in the performance of the duties imposed on the Board as are deemed of general interest, you are respectfully referred to the report of the Secretary and the papers accompanying it.

The present year has been an eventful one in the sanitary history of the nation. The organization of a National Board of Health has long been desired by sanitarians, and its final accomplishment is due in part at least to their persistent efforts, and to the growth of that enlightened public sentiment "which demands with increasing emphasis the incorporation of sanitary into civil administration." The influence which such an organization must exert in strengthening the hands of the various state boards cannot yet be fully appreciated, but we look to it with hope that in it will be found a power which shall be "for the healing of the nation."

The present organization is temporary, and in a measure experimental, one of its duties being to report a plan for an organization of similar character, which it is hoped will be permanent, and under which will be given opportunity for the study of preventable diseases, and for systematic efforts for their restriction on a scale hitherto impracticable. What has been accomplished during the year in our southern cities by the co-operation of this body with state and local boards, affords an ample illustration of the beneficent influence of rightly directed sanitary labor. There is no doubt that the vigorous measures inaugurated and carried out by health boards and sanitary associations have saved the south from a general renewal of a yellow fever epidemic such as it suffered from in 1878, but with which one city only has been afflicted to any considerable extent during the present year. Repeatedly appearing in its own chosen fields, it seems to have been as often met and vanquished by well directed and unremitting sanitary labor. Such results inspire confidence that similar labor will meet with ample reward in the restriction of disease everywhere, but "continued relentless war with filth, and bad smells, and all unsanitary conditions, is the price of such results." Yellow fever, by the fierceness of its contagious character, and by the appalling fatality attendant upon it, has naturally and justly attracted to itself the attention of the nation. Yet it has very recently and very pertinently been said that it is really "one of our minor diseases." Here in Wisconsin we have little reason to fear that it will ever prevail to any great extent, but here in Wisconsin, other diseases quite as preventable have been the cause of a greater loss of life during the present season than has yellow fever in Memphis; nor has Wisconsin suffered in this respect more heavily than many of her sister states at the north.

Another organization formed since the date of our last report, is

THE SANITARY COUNCIL OF THE MISSISSIPPI VALLEY.

This is a voluntary association, composed of members of State and Municipal Boards of Health in the region from which it takes its name. In view of the severe epidemic of 1878, it was felt that an urgent need existed for co-operative action on the part of those states and localities liable to be visited, or in any way affected by a recurrence of yellow fever, and that some well ordered system of inter-state sanitary police should be agreed upon and efficiently carried out by the representatives of the states and cities in question. While, as has already been said, the state of Wisconsin may have little to fear from this particular form of disease, it is yet favorably situated for the reception of infected persons, both from *its exposed western* border, and from the fact that its agreeable climate and many attractive places of resort are annually bringing thousands of people into its territory from the cities and towns along the lower valley of the Mississippi.

In order that Wisconsin might come into harmonious co-operation with other states in the execution of all necessary rules and laws of inter-state quarantine, this Board heartily entered into the plan and organization of the council, the services of which can be made available, with effect increasing with experience, in case of the threatened invasion of any form of pestilential disease.

Our record of diseases is for the year ending May 31, 1879, and embraces reports received from 795 of the cities, towns and villages of the state. We invite attention to the statistics given concerning sickness in the Secretary's report, and to the cost of a few of the most common of the diseases which have been prevalent, as computed from the estimates of a large number of observers.

SMALL POX.

has appeared during the year in eight localities, but has happily been so well managed in each of them as to have been prevented from obtaining any permanent or considerable foothold; the total mortality from it, according to the best and most carefully corrected advices obtainable, has been only 27 cases. For several months past it is believed that it has not existed in the state at all.

DIPHTHERIA,

however, has been of unusual prevalence and fatality. This disease has been emphatically the scourge of the state as it has been of other parts of the country. The deaths from it, so far as they have come to our knowledge, have numbered 1,234 during the year; it is known, however, that more than this have occurred, the fact of their occurrence having been reported, but not their number.

Concerning this disease there seems to be a wide-spread misapprehension of its true nature, and a strange reluctance to accept the teachings of sanitary science with regard to its contagious character and other established facts respecting its causes and prevalence. This Board has persistently sought to instruct and warn the people concerning these matters, and it has evidence that its efforts have been productive of benefit in many places.

The prolonged presence and unusual severity of diphtheria in one of our smaller cities gave occasion for the visit of a committee of the Board for the purpose of investigating the causes of its long continuance. From a careful study of all the facts, the members of the committee were convinced that it was chiefly spread and continued through personal contagion, the possibility and probability that many obscure and seemingly mysterious cases were to be thus accounted for having been fully demonstrated. Admitting, as probably we must in the present state of our knowledge of this disease, that in any given epidemic there may be a residuum of cases not to be accounted for by contagion or by filth origin, the conclusions arrived at by the committee concerning the epidemic in question are nevertheless so in accordance with sanitary principles of universal application, that we present them here for the wider circulation which this report will give them, in the hope that other localities may be benefited by their lessons.

After expressing the belief that in this particular epidemic a large part of the suffering might have been avoided and many lives saved had there been proper isolation of cases, the report proceeds:

"But though diphtheria may be spread by contagion, there is also to be considered as contributing to its diffusion, the fact that filth furnishes a favorable soil for its development. It is doubtless true that the disease may be of such fearful malignancy as to strike down those whose sanitary surroundings are the most favorable, but there is no doubt that its chief harvest fields are in homes or localities where filth and uncleanliness prevail. In view of this fact, we cannot close this communication without particular reference to the neglect of proper precautions that is manifest in your city in this respect. During the period—now nearly three years—that diphtheria has prevailed, the attention of authorities and citizens has been repeatedly called to the existence of filth conditions wholly uncared for during this lapse of time.

"That no public steps have been taken during all this time to remove this evil, is not creditable to the authorities of your city. Against such an epidemic as that from which you have suffered, it certainly would seem to be only common prudence to fortify yourselves *by the removal* of all that can possibly contribute to, or in any way invite its presence. It is evident that this can be done only by the united and systematic action of the city government.

"The law constitutes your city council a Board of Health, and invests it with ample and almost unlimited powers in the abatement of nuisances or the removal of causes of diseases, but never having exercised these powers, it has suffered these unhealthful and disease-breeding connections to remain in action during this whole period.

"We feel constrained, therefore, to earnestly recommend that immediate steps be taken by your common council to remove this reproach, and to place your city in the best possible sanitary condition. As a necessary preliminary to this, let the council appoint some competent physician as its health and executive officer, authorizing and directing him to place the city in that condition of cleanliness which is the best safe-guard against the invasion or continuance of any disease. With the health officer so appointed, let your citizens co-operate in the effort to remove every possible source of filth whether on public or private premises.

"The effect of this course, and of remembering that diphtheria is a highly contagious disease, to be isolated when it does occur with a carefulness of medical supervision akin to that with which a case of small pox would be treated, would be, we confidently believe, speedily manifest in the diminished number of cases from which you would suffer, and in the milder character of cases which may follow unavoidable exposure to cases from without — a danger to which you would still be liable. Doing these things, you will have done what sanitary science suggests as your best safeguards. Neglecting them, you assume the responsibility of continuing a state of affairs which must be considered as an invitation for the continuance of the sad experience of the past."

If the lessons inculcated in the above report could have been universally heeded, we believe that hundreds of lives that have gone out before this pestilence might have been saved.

SCARLET FEVER,

next in order of fatality, has prevailed to a considerably less extent than during the previous year, the number of deaths reported

377, being almost exactly the same, while the area from which reports have been received is much larger.

TYPHOID FEVER, MEASLES AND WHOOPING COUGH,

though not increased in number, seem to have been of greater severity, the reported mortality being in a larger ratio to the number of cases.

The Board has again to thank many co-laborers in sanitary work for valued suggestions and for assistance which it has received from them. In these we find not only encouragement to continued effort, but conclusive evidence that this labor, which is for the people, is reaching them, and meeting a real want. The demand for the reports and circulars of this Board is steadily increasing, and is regarded as an indication of the demand for sanitary instruction.

THE SPECIAL CORRESPONDENCE

of the Board during the year has been particularly full and valuable. This will appear from an examination of the extracts therefrom which have been selected for presentation to you herewith, as illustrative, to a great extent, of the spirit of the whole. This correspondence presents information of general interest from many careful observers, both professional and non-professional, concerning the sanitation of their respective localities. Such correspondence is welcomed from all who are interested in the prevention of disease and the prolongation of life. One letter from a special correspondent, Dr. A. J. Schweichler, late of Port Washington, gives so full and instructive a

HISTORY OF AN OUTBREAK OF TYPHOID FEVER

at that place, that we transmit it as a separate communication.

During the year, the sanitary condition of the school buildings of the state, and the effects thereof upon the health of students in our public schools, have been carefully studied, a more particular reference to which will be found in the Secretary's report. Such study has gone far to confirm the general application of the statements made by a special correspondent * concerning the schools of his own county, which we quote as follows:

"The sites of many school houses are unwisely selected, and during wet seasons are very unhealthy. Many cases of illness can be traced to them. There are some good buildings, but they are uncomfortable in arrangement and not ventilated. I venture the statement that not a single school in this county [one of the best in the state], excepting, perhaps, those of the cities and larger villages, is properly ventilated, can be perfectly heated, or has a sufficiency of cubic space for each pupil. Their feet freeze while their brains are heated. The furniture is universally unsanitary; the seats are too high or too low, slant too far forward or too far back, and the same is true of the desks.

"The light is effectually shut out of some school buildings; to my knowledge, there are three school houses within a radius of five miles, each of which has a large attendance, and each of which has just three windows. These windows contain just nine square feet of glass each, giving a window surface of twenty-seven square feet to a floor surface of six hundred square feet [*a proportion of one to twenty-two!*] Place a plant in such a room away from the sunlight, and it becomes puny and faded. Children cooped up in such rooms become apathetic, myopic, and frequently sick. Who has not heard complaints of headache, languor, malaise, from pupils in such rooms? Give them better air and more light, and these complaints will disappear.

"Not only are such buildings black holes, so far as light is concerned, but they are damp as well. Some stand only a few inches above the ground, others have the sills directly *on* the ground, and in others still, a portion of the building is planted *into* a side hill, or banked up with earth to shut out any air which might otherwise stray under the floor to dry and thus prevent the decay of the timbers. Who will guarantee that, when the room is heated, the floor shall not warp and spring? Let this take place, and at once the evil odors of putrescence are poured in upon the already exhausted, overtaxed and unstrung pupils. Raise a plank from one of these ground floors, and note the terribly offensive and dangerous effluvium which salutes the nose! Some of our country schools are little better than pest houses. Take one, for example, which measures twenty by thirty feet on the floor, and is eight feet high—not an unusual size; it contains four thousand eight hundred cubic feet, and into it are put, say forty pupils; each pupil will have a breathing space of one hundred and twenty cubic feet (no allowance being made for the space occupied by furniture, stove, etc.), and in cold weather the air will be changed three times in the course of the day, *i. e.*, during the recesses and at noon. In addition to all this, the thermometer, if there were any, would mark from 90° upward, instead of 65° or thereabouts. Is it any wonder that pupils are stupid, tired, sick with headache and similar ailments?

---

* Dr. H. P. Wenzel Lomira.

"The picture is a sad one, but it is drawn from actual experience and observation. Remodel the school rooms and let fresh air circulate in, and under, and all around the building. Let education be more gradual, and then there will come from our school houses men and women not less well educated, and better fitted to do the work and bear the burdens of life."

Some of the results of this investigation may be found in two papers that are herewith presented, the one by Dr. Reeve, entitled

OUR PUBLIC SCHOOLS IN THEIR RELATIONS TO THE HEALTH OF PUPILS,

in which the writer has performed a duty assigned to him of making "an investigation into the extent to which hygienic studies are pursued in our public schools, with suggestions thereon." In this paper the writer shows that such studies are almost wholly unknown in the common schools, and that no knowledge of physiology or hygiene, either physical or mental, is considered essential in the teacher. The questions of school age and the capacity of young children are also dealt with, and liberal extracts are given from the opinions of prominent teachers in the state, all of which go to establish the fact that children are harmed rather than benefited by admission to the public school at the minimum age now sanctioned by law.

The paper next discusses the number of studies pursued and the amount of work required by them, together with the circumstances and health conditions under which that work is being performed and maintains that injury is done to our children by the nature of the tasks imposed, and by the unhygienic condition of the buildings in which the tasks are to be wrought out, and their surroundings. The writer enters a plea that physiology and hygiene may have a larger place in our educational systems, and points out many ways in which the health conditions of students may be improved. He insists that teachers should be sanitary students, and that they should recognize more clearly than they have hitherto done the composite nature of childhood, and that mental and physical culture must be co-ordinated if the child is to arrive at efficient manhood or womanhood.

The second paper, by Prof. Chittenden, upon

OUR SCHOOL HOUSES,

is based upon several hundred reports upon the actual condition of as many school buildings in Wisconsin, and presents material for careful consideration. The information is arranged under the following heads: Sites, School yards, Drainage, Cellars and air spaces, Height of buildings, Ventilation, Heating apparatus, Arrangement of light, School furniture, Hat and cloak rooms Out-door accommodations, Water supply, and Means of preventing the spread of contagious diseases through the medium of the public schools. Under each head quotations are made from several reports, almost all of which go to show the need that exists for a thorough reform in very essential respects. Some of the defects brought forward for discussion should be remedied at almost any cost — if need be, by legislation under stringent penalties. The whole picture presented is not one calculated to cause much pride at the practical working of some portions of our common school system.

It is not thought probable that Wisconsin school houses are much, if at all, worse than those of other states in respect to their sanitary condition; so far is this from being the case, that there is evidence that they are in some respects better. This fact, however, offers no justification for the shameful condition of things found in some districts, and partly revealed in the reports quoted. What can be said of a district in which the outhouses are thus described: "The doors are gone and the boards torn off from one end. The sexes are both obliged to use the same apartment, and the exposure is shameful."

"HOMES FOR THE PEOPLE,"

is the title of a paper prepared by Gen. Bintliff, in which he has pictured the effect of homes on the characters of their occupants, and shown the fearful consequences suffered from an overcrowded population, from poorly ventilated houses, etc. The increased longevity arising from improved sanitary surroundings of the dwelling is pointed out, and statistics are given from the returns of various cities, both of America and Europe. The relative healthfulness of town and country life is also discussed, and the means pointed out whereby the greater mortality of dwellers in cities may be prevented as far as possible.

Gen. Bintliff has also continued his labors as chairman of the committee on

INSPECTION OF PUBLIC BUILDINGS,

and presents a report of the sanitary conditions of the Normal School buildings of the state and that of the Industrial School at Waukesha, in which existing defects are pointed out, together with the remedies therefor.

Dr. Witter presents a brief paper upon

GROUND AIR IN ITS RELATIONS TO HEALTH,

in which some dangers to health are pointed out that usually receive but little attention. The writer shows that the soil on which our homes are built is permeated by atmospheric air which may be contaminated by filth, and, being drawn into the house, may become the cause of disease in those who breathe it. Our houses form, as it were, huge chimneys, and, when heated in cold weather, gaseous impurity may find an easy entrance, either from the cellar or from the ground beneath. Simple methods by which the danger pointed out may be avoided are mentioned.

Prof. Chamberlin has, by invitation of the Board, prepared a valuable article on

THE ADULTERATION OF FOODS,

a subject deservedly attracting considerable attention at the present time. The history of adulteration is given, together with an account of the efforts made by different governments to prevent it. Various articles of food, purchased in open market, were subjected to analysis by Prof. Chamberlin and his assistants; among these were coffee, tea, sugar, confectionery, vinegar, various spices, baking powders, and bread-preparations.

The writer claims that the most effective method of preventing frauds of this character is to show the public the means by which they are committed, and the methods whereby they may be detected, both of which he has done in the paper herewith presented.

ILLUMINATING OILS.

Your attention and that of the legislature is called to the fact that this state is now without any efficient law regulating the sale of illuminating oils, and that such oils of exceedingly low grade, and consequently dangerous character, are being freely sold in our markets to an unsuspecting people. Our attention having been attracted by the frequency with which kerosene accidents were reported, we have made a careful examination of many specimens of oil, which have been sent to us for that purpose, including samples of oils which have exploded while actually in use, causing either the loss of property or life, or resulting in serious personal injury. Each one of these samples, without exception, was found to be explosive at a temperature many degrees below that frequently attained in a common kerosene lamp in ordinary use, and some were found to explode at a temperature below that often reached in an ordinary living room; they were little, if any, safer than common naphtha or benzine, of which, in fact, they chiefly consisted. Many other samples of the oils commonly sold in our markets have been also tested by us with the result of confirming our conviction, that so long as we are without the protection of a law which shall prescribe suitable tests to which all oils offered for sale shall be subjected, and which shall entirely prohibit the sale of such as do not bear this test, so long will our people be liable to the dangers arising from the use of burning fluids of any degree of vileness to which the cupidity of dealers may lead.

That the protection which may be given by such a law is entirely practicable and in the interest of the highest economy, is proven by the experience of other states where such laws exist, and where kerosene "accidents" are verv rare. These so-called "accidents" are wholly preventable by suitable legislation duly enforced, and this, too, without any oppressive increase in the cost of burning oils.

Another form of adulteration of illuminating oil is by the introduction of paraffine or paraffine oil; by the use of either of these substances, a low test oil may be made to pass a test much higher than it could possibly endure otherwise; but this elevation of the flashing or burning point is obtained at the expense of the illuminating qualities of the oil. Several samples have been brought to us which appeared to be safe oils, but of which complaint was made that they gave a very imperfect and smoky light. Proper examination showed that they contained paraffine in considerable quantity. This fraud is probably resorted to for the double purpose of increasing the refiner's profit, and of creating a false impression in the public mind that high test oils are not well suited for illuminating purposes. In view of these and other facts, we respectfully ask your attention to this subject, and recommend such legistion thereupon as the public safety requires.

VITAL STATISTICS.

We regret that the record of marriages, births and deaths collected under existing laws are still so imperfect that no deductions can be based upon them concerning the vital statistics of the state, and that, consequently, these returns are wholly without value so far as the objects of this Board are concerned. It appears to us that some additional legislation will be necessary before these statistics can be made of use as exhibits of the marriage, birth and death rates of the state. The Board is not, however, prepared at present either to urge or recommend legislation of this character, inasmuch as arrangements have been made whereby a collection of vital statistics of the state will be made in connection with the national decennial census — a collection which we have reason to hope will be more accurate than any that has hitherto been made in this country. It seems to the Board eminently desirable that the state should co-operate with the general government in securing the collection of such statistics at periods intermediate between the national decennial collections, and upon a plan substantially in correspondence therewith. Very respectfully,

E. L. GRIFFIN,
J. T. REEVE,
JOHN FAVILL,
SOLON MARKS,
JAMES BINTLIFF,
H. P. STRONG,
G. F. WITTER,
State Board of Health.

SECRETARY'S REPORT.

To the Board of Health and Vital Statistics of the State of Wisconsin:

GENTLEMEN: I have the honor to present the following, my fourth annual report, as your secretary and executive officer, it being for the partial year ending October 31, 1879.

No changes have occurred in the membership of the Board since my last report, the vacancy occasioned by the expiration of the term of office of the secretary as a member of the Board, having been filled by his re-appointment. The present constitution of the board, with the addresses and terms of office of the several members, is therefore as follows:

Gen. James Bintliff, Darlington; term expires February 2, 1880.
Solon Marks, M. D., Milwaukee; term expires February 2, 1881.
John Favill, M. D., Madison; term expires February 2, 1882.
E. L. Griffiin, M. D., Fond du Lac; term expires February 2, 1883.
G. F. Witter, M. D., Grand Rapids; term expires February 2, 1884.
H. P. Strong, M. D., Beloit; term expires February 2, 1885.
J. T. Reeve, M. D., Appleton; term expires February 2, 1886.

No change has been made in the officers of the Board during the year, Dr. E. L. Griffin having been re-elected president at the annual meeting held at Madison in January last, and Dr. J. T. Reeve having been continued as secretary. An appropriation of three hundred dollars was made for clerical services during the year.

At the same meeting the following standing committees were appointed:

On Finance, Drs. Favill, Marks and Witter.

On Legislation, Gen. Bintliff, Drs. Strong and Witter.

On Printing and Stationery, Drs. Reeve, Favill and Griffin.

The committee on Visitation and Sanitary Inspection of Public Buildings was re-appointed, to consist of Gen. Bintliff, Drs. Marks and Reeve, power being given to the chairman to associate with himself in this work any other members of the Board as he might deem it advisable.

After much discussion of the general work of the Board, the following subjects were re-assigned for special study by the members named:

Homes for the people, to Gen. J. Bintliff.

The necessity for general hygienic knowledge among the people, to Dr. H. P. Strong.

Criminal abortion, to Dr. J. Favill, and

An investigation of the extent to which hygienic studies are pursued in our public schools, with suggestions thereon, to Dr. J. T. Reeve.

At the same meeting two circulars, the issue of which had been previously authorized by the Board, were reviewed and discussed. The first of these was a circular on diphtheria, prepared for general distribution wherever that disease, then unusually prevalent in the state, was known to exist. As finally adopted and distributed this circular was as follows:

DIPHTHERIA.

Diphtheria is a contagious and infectious disease of great severity and frequent fatality. In view of these facts, the State Board of Health urges upon the citizens of Wisconsin the exercise of such precautions as experience has proven to be effectual in its restriction and prevention, and to this end calls attention to the following facts and suggestions:

ITS RELATION TO FILTH AS A CAUSE.

Diphtheria occurs most frequently, and in its most fatal forms, in localities which are filthy. It does not matter whether the filth exists in visible and disgusting forms, such as the garbage heap, the cess-pool or the privy vault, or in the invisible and possibly inodorous gases from an illy-constructed sewer, from decaying vegetables in the cellar, or in the poisonous exhalations from the human breath and body in unventilated rooms. Its effects are to lower the vitality of the system, make it less able to resist the attacks of disease of any kind, and fit it for the development of the worst form of any prevailing epidemic.

From any form of filth, either upon your own or your neighbor's premises, poisonous vapors may fill the house, to be inhaled with every breath; or the leachings of filth may penetrate through many feet of soil and pollute the water supply, which to casual inspection appears pure. Diphtheria has so often appeared where such uncleanly conditions have prevailed, when it could not be traced to continuous propagation by infection or contagion, that its relation to filth as a cause is well established, and *it is rightly characterized as pre-eminently a filth disease.*

ITS CONTAGIOUS AND INFECTIOUS CHARACTER.

Whatever may be its origin, diphtheria is unquestionably contagious and infectious, and may be communicated from one sick with the disease to another by the breath, through the air which surrounds him, or by the secretions or discharges from his person.

It may also, but with less certainty, be carried from one place to another and communicated by means of clothing, food and other articles, which have been contaminated in the sick-room.

As a rule, the danger of exposure to the disease is in proportion to the malignancy of the case, but to this there are many exceptions, and exposure to the mildest case may be followed by the severest form of the disorder. Children are most susceptible to the disease, and may contract it in its worst type from the kiss of an adult who has what appears to be but a trivial " sore throat."

The time that elapses between exposure to and the subsequent development of diphtheria in the person exposed, bears some relation to the malignancy of the disease and its prevalence as an epidemic at the time. Usually it appears within the first week, but in exceptional cases its appearance may be delayed to a much later period.

SPECIAL MANAGEMENT OF CASES.

It is of the first importance that an outbreak of the disease should be the signal for the immediate observance of those precautions which are known to be most effectual in the restriction of any contagious disease, and in this respect the treatment should be as vigorous as in a case of small-pox or scarlet fever, *the one rule of most imperative necessity being the isolation of the patient.*

IMMEDIATELY upon the appearance of the disease, the patient should be removed to a room as remote as possible from family occupancy. This room should be prepared for his reception by removing from it all superfluous furniture, especially such as woolen carpets, extra clothing, books, and all window curtains, table spreads and other similar articles which cannot be subsequently cleansed *by boiling.*

The room should be large and sunny, and it is better if it be in the upper part of the house. Particular care should be taken to have it ventilated as thoroughly as possible, while the patient is protected from any direct draughts, in order to *dilute the poisoned atmosphere* to the utmost extent. This will be facilitated and the care of the patient rendered easier, if it be practicable to place the bed so as to make it accessible from all sides.

No one should be admitted to the sick room except the necessary attendants, whose garments should be made of such material as will admit of being cleansed by boiling.

No food which has been in the sick room should be partaken of by the well; even the dishes which have contained such food should be cleansed by themselves.

Under no circumstances should the patient's soiled bed or body linen be mixed with other soiled clothing, or be admitted to the general wash; it should be at once cleansed by *boiling* water.

For the cleansing of the mouth and nose from the discharges which are sometimes copious and always dangerous, bits of linen or cotton cloth, or pieces of soft paper, should be used and immediately burned.

Discharges from the bowels and bladder, which are also sources of danger, should be received in vessels containing disinfecting fluids, and as soon as possible removed from the room and buried. If received on cloths, these should be burned.

For the purposes just mentioned, copperas, otherwise known as sulphate of iron or green vitriol, forms a cheap, convenient and efficient disinfectant. It is prepared for use by dissolving two pounds of copperas in a gallon of hot water. In malignant cases, it is recommended that an ounce of crude carbolic acid be added to each quart of this solution. These materials also form a good disinfectant for privies, drains and other foul places, and may be prepared for this purpose by adding eight pounds of copperas and one pint of crude carbolic acid to five gallons of hot water. From a pint to a quart of this solution used twice a day will suffice to keep down foul odors; a much larger quantity, however, is needed for the first application.

Another disinfectant, recommended by the New York Board of Health, which may be freely used in the sick chamber, and which is especially adapted for the reception of soiled clothing until it can be further cleansed by boiling, is composed of sulphate of zinc (or white vitriol) eight ounces, carbolic acid one ounce, and water three gallons.

Still another convenient and efficient disinfectant is the solution of chlorinated soda known as Labarraque's Disinfecting Solution, which, diluted with from eight to twelve parts of water, may be used for cleansing utensils, washing the hands of attendants, etc.

THE RECOVERY

of the sick person should be complete, and the cleansing of the person thorough, before he again mingles with the well, and, during the presence of diphtheria in any family, all members of that family should be excluded from the public schools and refrain from attendance upon public assemblies or unnecessary intercourse with others; and this isolation and practical quarantine should continue until, in the judgment of some competent physician, it is safe to remit the precaution.

IN CASE OF DEATH,

the funeral should be conducted with little publicity and without exposure of the body, which should early be placed in a tight coffin with some of the disinfectants above mentioned. *In no case should children be permitted to attend such funerals.* The neglect of these precautions is known to have been the cause of the death of many persons, in this state and elsewhere.

SUBSEQUENT CARE OF THE PREMISES.

Rooms from which patients who have had diphtheria have been removed should be thoroughly disinfected by fumigation, and if there has been any special malignancy of the disease, all paper hangings should be removed from walls covered therewith; all other walls and all ceilings should be freely whitewashed, and the wood work and floors be thoroughly scrubbed.

Sulphurous acid gas, or the fumes of burning sulphur, is an efficient, convenient and inexpensive disinfectant. Two pounds of sulphur will suffice for a room twelve feet square and ten feet high. It needs but to be burned in the room by putting it, in powder or small fragments, on live coals, in a safe vessel; all doors, windows, and other apertures should be tightly closed during the burning of the sulphur, and for several hours afterward, and the room should then receive free and prolonged ventilation.

GENERAL PREVENTIVE MEASURES.

Finally, while isolation and disinfection should be thorough and persistent in the presence and for the restriction of diphtheria or other dangerous and contagious disease, it should be remembered that no care to isolate patients or to disinfect premises already contaminated can atone for the neglect of those precautions which all experience has demonstrated to be capable of mitigating the violence of, if not wholly preventing, contagious disease of every kind.

Cleanliness and purity of air are the deadly foes of all contagion. Pure air, pure water and a pure soil are essential conditions of healthful life, and the surest safeguards against disease.

Secure dryness for every part of your dwelling by thorough drainage; secure cleanliness for every part of your premises by careful removal of all decomposing animal or vegetable matter, by allowing no garbage heap or cess-pool to remain near the house, and by frequently cleansing and disinfecting the privy, the contents of which may at all times be kept entirely inoffensive by the plentiful use of dry earth or coal ashes. Examine and correct any defects of sewerage. In short, let there be nothing left to pollute the atmosphere or poison the water supply. Let the sun and air have free access to the house, and especially to the sleeping rooms. Secure proper and well-prepared food, and comfortable clothing, and "the pestilence that walketh in darkness" and revels in filth will pass you by seeking a more congenial soil.*

The continued prevalence of diphtheria in the state in many localities, to be more particularly referred to when the reports from local health boards are discussed, has created a large demand for the foregoing circular, of which ten thousand copies have been distributed. It has also been reprinted entire in many newspapers of the state, and has thus been brought very prominently to the attention of the people. Thanks are due especially to the publishers of the Madison *Democrat* for thus reprinting it in its "patent" edition, furnished to a large number of country papers, thus adding very largely to its circulation. There is reason to believe that in not a few cases its circulation has been productive of great good.

It may not be inappropriate here to refer to the very positive evidence given in the correspondence of this office to the highly contagious character of diphtheria, and to the many ways in which it has been spread, where, without expert investigation, exposure to it would have been deemed impossible. In some cases it seems to be clearly proven that the disease was transmitted through clothing, or other infected articles. Two instances of this character may be briefly referred to; in one, a poor woman whose home was in an isolated locality, but who herself was out at service from house to house as occasion presented, received at one place, as compensation for her labor, a lot of cast-off children's clothing from a family in which there had been a death from diphtheria. Ten days later, her own children, who had not been otherwise exposed, but who, meantime, had worn this clothing, were taken down with the disease.

In, the other case, the malady seems to have been communicated by means of papers and magazines, borrowed at a time when diphtheria had apparently wholly disappeared from a community, from a family in which a malignant form of the disease had prevailed. These magazines, etc., having been handled by two children in the family which had borrowed them, they were both stricken down with the disease, within ten or twelve days thereafter, and so nearly simultaneously as to prove a common origin. In the opinion of the correspondent, who was the attending physician, the contagion had lurked in these papers.

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* Copies of this circular for distribution may be obtained in any number desired, by addressing the Secretary of the Board.

In other cases, clothing, which had not been worn or handled by diphtheritic patients, but which for some time had been in their presence, was believed to be the medium of spreading the disease. In yet another class of cases, the disorder has undoubtedly been spread through schools by patients who had sufficiently recovered to resume their places in class, but in whom some of the sequelæ of the malady were yet present. These examples rival the famous Vermont school house case, not in severity, happily, but in the clearness with which they explain certain outbreaks of the disease in localities remote from each other, and with no common exposure except in this way.

Many other instances in which diphtheria and other contagious diseases have been spread by means of schools are to be found in letters received from our correspondents. The danger is intensified during the season when doors and windows must be kept closed, but may be reduced to a minimum by the observance of proper sanitary principles. We quote in illustration from a letter very recently received: "Last May in School District No. —, a malignant form of diphtheria broke out. There were eleven cases, and out of that number seven proved fatal. The school was closed on account of the general alarm, and the disease disappeared, nor were there any further cases until the latter part of July, a very dry time, and one at which unusual good health prevailed.

"The disease now appeared simultaneously in four families living quite long distances apart and not in the habit of visiting each other. On inquiry, I learned *that the school had been re-opened, that all the sick children had attended it, and that among the pupils were three who were yet suffering from the sequelæ of the disease in the form of discharges from the throat and nostrils.*

These facts, I think, point unmistakably to the conclusion that the disease is a contagious one, and that school officers should exclude children suffering from it from attendance at school."

The second circular to which reference has been made, was issued to the teachers in our public schools, for the purpose of obtaining information in regard to their sanitary condition and the physical effects of the work done in them. This circular was submitted, before its issue, to the State Superintendent, from whom it met with cordial approval; his practical co-operation was also given in the form of a special circular from his office, addressed to the city and county superintendents, asking their assistance in the work, which was generally cheerfully and promptly rendered; many of these gentlemen issued circulars to the teachers in their respective jurisdictions in which the work was "commended to the most careful attention of the teachers," and such answers requested as would "give the Board reliable data upon which to base a report." The facts were acknowledged that "very many school houses were constructed and kept up in direct opposition to the requirements of the public health," and that "many evils of long standing called for reform." For the full and generous replies which have been received in response to the circular from this office, by means of which the Board has been placed in possession of very complete information concerning the sanitary condition of a large number of the schools of the state, we are largely indebted to this active co-operation on the part of the head of the Department of Public Instruction, and the various county and city superintendents. From this information has been drawn the material for the papers prepared by Prof. Chittenden and by the Secretary, both of which have already been approved by you for publication.

A copy of the circular issued from this office is here presented, and following it a copy of that prepared by the State Superintendent.

OFFICE OF SECRETARY OF STATE BOARD OF HEALTH,
APPLETON, WIS., *March* 20, 1879.

To the Teachers of Public Schools in the State of Wisconsin:

The State Board of Health desires to obtain as much information as possible in regard to the sanitary condition of the school buildings in this state, and their surroundings, and also in regard to the physical effects of the work done in these buildings upon their occupants. The reports of the State Superintendent show that nearly one-fourth of all the residents of Wisconsin spend a large share of their time in school rooms; hence, it will be seen that the subjects referred to in the following circular are of the highest importance as concerns the health of the rising generation.

You are therefore earnestly requested to answer as fully as possible the following questions, and forward your reply, as soon as practicable, to this office, using the accompanying stamped envelope for the purpose, and leaving any excess of postage to be paid here.

1. Give your name, postoffice address, and the location of the buildings upon which you report.

2. Describe as fully as possible the buildings in which you teach or which are under your control, giving the character of the soil on which they stand, presence of any marsh, or other stagnant water in the neighborhood, material of which they are built, their size, the number of stories in each, number of rooms, number of cubic feet in each school-room, etc.

3. Describe the entries, passages and stairways, using rough diagrams, if necessary, and give the height of each flight of stairs, as a whole, and the height and breadth of the steps.

4. Describe the study and recitation rooms, stating whether the walls are hard finished, papered, white, or tinted, giving the relative positions of blackboards and windows, the proportion of glass (excluding sash work) to floor surface, and any other particulars that may be needed to convey an accurate idea of all arrangements.

5. Are all seats and desks in each room of uniform height, or is allowance made for varying height and age of pupils?

6. What is the whole number of pupils, and what the number in each room?

7. How are your school-rooms ventilated, and how many cubic feet of air per hour is secured to each pupil? If there be any special system of ventilation, describe it fully. Is the apparatus for ventilation in operation or disuse? Is it satisfactory?

8. How are your school-rooms warmed? Has the system of warming them any connection with that of ventilation?

9. Is there any cellar or air-space under the building?

10. Is there any proper drainage system for the cellar or air-space, if there be any, or any such system for the building and its site?

11. Describe the school-yard or play-ground, stating whether it is enclosed or open, paved or not, its area, etc.

12. Are there any rooms in the building into which the sun never shines, and, if so, for what purposes are they used?

13. From what direction do the pupils receive the light upon their work; *i. e.*, right or left hand, front or rear, above or below the level of the eyes?

14. Describe as clearly as possible all water-closets or privies, giving size, location, in or out doors, distance from main building, from pump or well, and the character of the vault, whether stoned or otherwise curbed.

15. Are the privies properly screened from observation and from the weather? If out doors, are they connected with the main building by covered ways? Is proper care taken to keep them dry, clean, warm and generally comfortable? Are sufficient and separate privies provided for the accommodation of the sexes; and is any special provision made for the needs of the youngest pupils?

16. If hat and cloak closets are provided, what is their position with relation to the study-rooms? How are they warmed and ventilated? Is there any provision made for drying wet shoes, wrappers, etc., in bad weather?

17. From what source is drinking-water obtained? Do you know or suspect any means by which the supply may be contaminated?

18. In your opinion, does any large proportion of our children suffer from the effects of hard study?

19. Is one sex more liable than the other to injury from this cause; and if yes, which?

20. Does the advent of puberty increase such liability?

21. Does the sight often suffer?

22. What is the largest number of studies pursued by any one pupil? What proportion of your pupils are obliged to study out of school hours, and how much time is needed by an average student to prepare the amount of work required?

23. What is the length of your daily session, and how is it divided? How frequent and long are your intermissions? Are the intermissions for older and younger pupils of the same length?

24. What text books on Hygiene are in use in your school?

25. What text-books on Physiology?

26. Is any instruction given in either of the above two subjects other than by text-books?

27. What proportion of your pupils are studying them in any way?

28. How can the physical condition of the pupils in our schools be improved, in your opinion?

29. What, if any, means are used to prevent the spread of any contagious disease which may appear among the pupils in the school?

In answering the above do not repeat the question; it will be sufficient to refer to it by its number.

By order of the State Board of Health.

J. T. REEVE, M. D.,
Secretary.

Secretary's Report.

OFFICE OF THE STATE SUPERINTENDENT,
MADISON, WIS., *April* 17, 1879.

To the County and City Superintendents:

The Secretary of the State Board of Health, J. T. Reeve, M. D., of Appleton, has issued a circular, addressed to the teachers of the public schools in Wisconsin; and in it he requests them to furnish this Board as full information as possible concerning the school buildings of the state, in regard to their sanitary condition and the effect of the work done in them upon the health of their occupants. The circular contains a list of questions which relate chiefly to the location and construction of the school buildings; to their conveniences for seating the pupils, for ventilation of the rooms, and for the admission of light; to the condition of the school grounds, respecting especially any system of drainage; to the character of the out-houses; to the sources of the drinking water; to the effects of hard study upon the pupils of both sexes; and to the arrangements for the daily sessions of the schools. This Board propose to embody, in an elaborate report, the information which they obtain on these subjects and others presented in this circular; and then to distribute this report widely throughout the state.

This work of the Board receives my most hearty commendation. The necessity for it has been shown me in my own limited observations in the state. Violations of the plainest laws of health are seen in very many of our structures for school purposes, not excepting those used by the state institutions, both charitable and literary. The dissemination of correct and practical views on the subjects which this Board desire to investigate, will result in incalculable advantage to the people of the state.

Let me urge you to assist the secretary of this Board in accomplishing this work: *first*, by properly distributing, among the teachers under your supervision, the copies of the circular which may be placed in your hands; *second*, by instructing your teachers so that they may furnish the answers which the Board seek to obtain to the questions they present; and, *third*, by giving, also, any information in regard to the schools and school buildings which may be in your possession, and which may be useful to the Board.

Very respectfully yours,
WM. C. WHITFORD,
State Superintendent.

At a subsequent meeting of the Board, in view of the excessive mortality which prevails among infants and young children, the secretary was instructed to prepare a special circular giving suggestions and directions for the care of the little ones, which it was hoped might be helpful in preventing this frightful waste of infantile life. In accordance with these instructions, the manuscript of the following circular was prepared and submitted to each member of the Board for approval; this being received, an edition of ten thousand copies was printed, a large portion of which has already been distributed in this state; requests for copies have also been received in large numbers from residents of other states. The many demands made for this and similar circulars of the Board indicate very plainly the popular wish for such instruction in sanitary matters as can be given in simple, untechnical language, and point to a field in which work may be done that shall have most valuable practical results.

THE CARE OF INFANTS AND YOUNG CHILDREN.

The sicknesses and the mortality of child-life bear a close relation to the age of the child. Strength and ability to resist disease, other things being equal, comes with every month of an infant's life.

The diseases which chiefly affect early infancy are those of the digestive organs; diseases of the lungs, the air passages and the throat, assuming greater prominence after the first year, and especially after the second summer.

These facts not only give general direction to the hygienic management of infancy, but they also give stimulus and hope to our efforts; for if our little ones can be kept in health through infancy and young childhood, we may reasonably hope for the continuance of life to manhood and womanhood.

THE CLOTHING.

One of the first essentials for the preservation of infantile health, is careful attention to the clothing. In this climate the use of flannel upon the chest, the abdomen and the extremities can rarely be safely dispensed with at any season of the year. Even during the heat of summer, if the child be at all feeble, the use of this material should not be neglected, though the garments may and should be light, if care be taken to meet the changes of the weather. A fruitful cause of disease lies in the fact that by following prevailing fashions, young children are often so clothed that no adequate protection is given to the chest or extremities. In this respect a radical reform is needed in many households.

The clothing should be loose throughout the whole period of infancy and child-life — so loose that there may be no impediment to the circulation of the blood or to the freest movements of limbs and body. It is better, in hot weather especially, if the whole clothing can be changed daily, but if this cannot be done, let it at least be thoroughly shaken when removed at night, and so hung up or spread out that it shall be thoroughly aired.

For children old enough to be restless at night, it is desirable to use for a night dress a combination suit of waist and drawers, in order to have the extremities effectually protected in case the bed-clothing is thrown off. This dress should also be thoroughly shaken when removed in the morning, and, if possible, aired and sunned out of doors during a part of the day.

Soiled linen or garments soiled by the discharges of young infants should be changed at once. They should not be dried in the nursery or living room, nor should they be used again before being washed.

THE FOOD.

For infants, the only natural and best possible food is breast milk. The prudent mother who, having a sufficient supply, finds her babe thriving on this, will be careful to feed it with nothing else during the first few months of its life, especially if it be during the heat of summer. Such a mother will carefully guard her own health, avoiding over-fatigue, over-heating her system, and anything else that may impair the nutriment of her child. In general, *such food and such habits as keep the mother in the best health*, without reference to special diet for the purpose, will best preserve and keep pure the nourishment for her babe.

The babe should not be nursed too often. Overfeeding is a prolific source of danger. So far as possible, a child should be fed at regular hours. Prof. Jacobi, whose directions have for several years received the sanction of the Board of Health of New York city, says: "Nurse an infant of a month or two, every two or three hours — of six months or over, five times in twenty-four hours, and no more."

Probably no rules can be given that would be of more general application than the above, though much must be left to the discretion of the mother.

The breast should not be given simply to quiet the child, nor should it, if well, be permitted to go to sleep at the breast until it has finished its meal. The child from the first should be less frequently nursed during the night than the day, and at an early age can pass the entire sleeping hours of the mother without nursing.

If the mother's supply of milk be insufficient, the child may be cautiously fed artificially in part, using the natural food and its substitute alternately; but if it be possible, he should be wholly nursed during the first months of his life, and should not be entirely weaned for a year. Weaning should not take place just before nor during the heat of summer. The process of weaning should be gradual, artificial food being substituted for the natural with such increasing frequency that the child will at last relinquish the breast *quietly.*

It is when a child has to be wholly "brought up by hand" that the greatest danger occurs. Here the problem is to supply a food which shall most nearly approach the character of that furnished by the mother. While this may possibly be done by using the milk of other animals, for most families the only substitute practically available is the milk of the cow, which, with careful preparation, is well fitted for the purpose, very few instances only being excepted. But there are some simple and easily observed rules concerning its selection and subsequent care which are not sufficiently heeded, though the baby's life may often depend upon their proper observance.

It is of first importance that the milk be pure, and that it be from healthy, well fed animals. It should be received undiluted, in *perfectly clean vessels*, and as soon after milking as possible. It should be kept by itself, and, in hot weather, in the coolest possible place; in such weather, it may with advantage be boiled, and divided in separate portions when received, in order to avoid the disturbance of the whole at the preparation of each meal.

The milk thus carefully selected and cared for, in order to make it most nearly approach the character of that given by the mother, should be diluted, should be slightly salted, and should be sweetened by the addition of about two teaspoonfuls of pure white sugar to the pint, or better, with twice that quantity of sugar of milk, which may be obtained at the druggist's. For very young infants it may be diluted from one-third to one-half, the proportion of milk increasing as the child advances in age. While healthy infants, whose digestive powers are good, may thrive and do well, where simply pure, hot water is used as the diluting material, it is nevertheless true that *the way in which milk is diluted is very often of great importance*, as the diluting material may be made not only to contribute to the nourishment of the child in itself, but also to *aid directly in the digestion of milk*. For this purpose barley water* is one of the best, most easily prepared, and most, convenient materials.

Lime water* will also often be found extremely useful as a diluting material for milk, and may be freely used where milk, or milk with barley water, disagrees with the child, and in the proportion above recommended.

For a vast majority of cases food thus prepared will be sufficient, and the baby's health will be best promoted by careful adherence to it. In the cases where it is found to disagree, a change in the source from which the milk is obtained may obviate the difficulty, or condensed milk may be substituted. In the more exceptional cases where these changes cannot be made, or where they obviously disagree with the child, it may be necessary cautiously to try other food. Of these there are many varieties kept in the shops, some of which are well adapted to individual cases, but there are some of easy domestic preparations and of established value, which, by trial, may be found sufficient. One of these is the

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*For method of preparing this, see note at end of circular.

FLOUR BALL,

which is prepared as follows:

Tie closely, in a linen cloth or in a pudding bag, a pint or more of flour. Drop this in boiling water, and let it boil for six or eight hours. What forces itself through the cloth is to be scraped off and thrown away. The flour within the cloth will then be found as a hard, dry mass. This is to be grated, and from a teaspoonful to a tablespoonful first rubbed into a paste with a little water, then boiled for a minute or two in a pint of milk, or milk properly diluted with water.

OAT MEAL.

Another, and one of the best of home-made preparations, is oatmeal gruel. To make this, a tablespoonful of oat meal may first be soaked for two or three hours, or over night, in a pint of water, then *thoroughly* boiled in it for an hour or more, adding water as needed. This is to be carefully strained while hot, and to have additional water or milk added to make it of suitable consistence to feed through a nursing bottle. Should this prove to loosen the bowels too much, pearl barley or rice may be prepared and given in precisely the same manner.

If milk has been found to disagree, leave it entirely out for a time, and prepare these foods with water only, resuming the use of milk very gradually.

All of these foods are suitable for very young children, as well as for those several months of age. They should be salted and sweetened as directed when speaking of the preparation of milk. In hot weather, particularly, each meal should be prepared only when it is to be given to the child. Food allowed to stand in a warm room soon becomes unfit for use, and, if it be given under such circumstances, will be productive of distress and sickness. For young infants, all of these preparations should be given through a nursing bottle, and should be about blood warm when fed. *The test of fitness in any given case is the health of the child.* The cry of a child is often caused by overfeeding or by improper feeding, and instead of being a demand for more food, is an indication that it is unable to digest what it has already eaten.

It is even more important that the hand-fed child should be regular as to the hours for eating and the quantity of food taken than that the nursing child should be so. *Absolute cleanliness of the nursing bottles is indispensably necessary.* The best kind is a plain bottle, with a rubber nipple, but without a tube; after use the nipple should be removed, the bottle emptied and well rinsed, and both bottle and nipple kept until needed for use again in clean water, in lime water, or in water to which a little soda has been added. The nursing bottle and nipple should be scalded daily.

Children advanced beyond the age of early infancy may be allowed a greater variety of food, according to the season, but throughout childhood the food should be simple and the meals regular. Milk should form a large part of the diet, and at the age of six months may be given clear. Not much before this age is it safe to give any solid food. After this age, stale bread or cracker, rare boiled egg, very finely scraped raw beef, or beef or mutton tea, may cautiously be given, but pastry and indigestible food of all kinds should be prohibited.

SLEEP.

After the first few weeks of his life the child should sleep by himself.[*] The bedding, both over and under him, should be frequently changed and daily aired. Quilts and other impervious articles of clothing should be discarded, and blankets which can be washed substituted. It is natural for a young child to sleep much of the time; if he does not sleep, but frets and is restless, if it be not a sign that he is hurt by pins or tight clothing, he may be suffering from indigestion, or he may be hungry, thirsty or sick. If sick, send for the family physician, but without his sanction or direct prescription, *never give any kind of soothing syrups, sleeping drops or cordials*, which almost, if not quite, without exception have opium or morphine for their active ingredients.[†] Regularity in putting the child to bed, even at a very early age, conduces to regularity of sleep and thus to general healthfulness. A child should never be deprived of its natural sleep, or rudely or unnecessarily awakened from it.

PERSONAL CLEANLINESS

has very much to do with the health of a child. Unless very feeble it should have its full bath daily; if very weak, sponging may be substituted. In addition to regular bathing, constant attention should be paid to the "careful cleansing of the skin from every vestige of impurity," and the speedy removal of soiled garments.

CLEANLINESS OF SURROUNDINGS.

The delicate and sensitive organization of the child makes him the most susceptible member of the family to the influence of unsanitary surroundings. The instances are very numerous where the little ones have suffered from the effects of foul air, from over-

[*] Comfort and safety will nearly always be promoted by an observance of this rule, and by having the cot or cradle of the child by its mother's bed, that it may receive necessary attention with the least disturbance; but in exceptional cases where the vitality of the child is feeble it may, especially in cold weather, be found to thrive best if taken into its mother's bed.

[†] There might properly be included in this advice a word of caution against the too frequent resort, without medical advice, to vermifuges of various kinds, giving under a hasty but often incorrect conclusion that the child has worms.

heated rooms, or imperfect ventilation, while the older and more hardy members of the household were not sensibly affected. For their sakes, then, if not for your own, "keep your houses sweet and clean, cool and well aired." During the hot season, keep the heat of the kitchen fire as far away from the nursery as possible. Overheating will cause sickness. Let the cellar be well ventilated and free from anything that can contaminate the air there, remembering that the whole house forms a sort of chimney, drawing into itself all the foul odors that are generated beneath it. Keep the kitchen sink, the cess-pool, if there be one, and all the surroundings of the house, clean, and urge the performance of the same duty upon your neighbors. Give the child the benefit of fresh outdoor air as much as is possible, especially in summer, but avoid exposing him to the direct heat of the sun. *See that the house has an abundance of fresh air day and night.* Let the sleeping room be the largest, sunniest, best ventilated room in the house, for it is there that the young child lives.

Finally, having by watchful care sought to guard against contagion and to *prevent sickness*, it is important, especially in seasons when the infantile diseases which load the mortality lists are prevalent, to note the very beginnings of such diseases, and to adopt appropriate treatment while they are yet in their incipient stages.

An eminent medical teacher asserts that a large proportion of the bowel complaints of children originate in the brief periods when there is *excessively hot weather, continuing through the night as well as the day*, though it may be many days before the disease becomes so prominent as to attract much attention. It is well to remember this assertion, and to *see that the little ones are especially well cared for at such times. During such nights, let the house be cooled and ventilated as fully as possible; keep the doors and windows open, lessen the excitement of the system and reduce animal heat by frequent use of the cool bath, by freely sponging the body or by the rubber water pillow.*

The popular idea that the second summer is the most dangerous to the life of the child is fallacious; it grows, doubtless, in part, out of another and dangerous popular idea, that diarrhœa is a natural and almost necessary attendant upon "teething," and that it is wrong to check a diarrhœa which occurs during this process. At the very commencement of any such disorder in children it should be controlled, and this may very often be done by observing the rules given above, and without medicine. In many cases it may be advisable to withhold food entirely for a few hours, to diminish the quantity of milk, or wholly to suspend its use for a time, substituting barley water, either alone or with the addition of the white of an egg to a half pint or a little less, resuming the use of the customary food by degrees and in very small quantities. Should this be insufficient, consult the family physician *before* disease has obtained a strong foothold

BARLEY WATER may be prepared by boiling a tablespoonful of ground barley in a half pint of water for about fifteen minutes, then straining carefully through a cloth. If too thick, or for very young children, increase the quantity of water. The barley should be bought whole, and carefully washed with cold water to remove impurities, mustiness, etc. It may be sufficiently well ground in a clean common coffee mill. The whole barley may be used, but requires much longer boiling. If there be any tendency to constipation, oat-meal prepared in the same way may be substituted.

LIME WATER may be prepared by taking a piece of freshly burnt stone lime as large as an egg, taking care to chose the cleanest and purest in appearance, slaking it in a suitable vessel, as, for example, a glass or stone fruit jar, and adding a half gallon of pure soft water; after shaking or stirring it well, allow it to stand for a few hours to settle; then remove any scum that mayform, pour off the clear liquid, and keep it in a tightly corked bottle. As the water will dissolve only a very small and definite proportion of the lime, the jar may once again be filled with water and the process repeated *

LOCAL BOARDS OF HEALTH.

It is with great pleasure that I again report a material increase in the number of reports received from the clerks of local boards of health, as compared with those received in any previous year, and with still greater pleasure that I refer to the fact, very apparent upon the record books of this office, that much more care has been very generally exercised in the preparation of these reports. Yet another gratifying fact to be noted, is that an increasing number of voluntary communications from this class of officers is each year received, either in connection with their formal reports or at other times. From quite a large number of such communications extracts have been made for publication, which will be presented in connection with extracts from special correspondents. When the difficulty of securing correct data on which to base these reports is considered, we must regard the results already obtained as gratifying evidence of the success of the Board in this direction. As the office of clerk to the local board is one liable to frequent change in the incumbent, we submit again the following paragraph from our last report, for the consideration of any who may be newly elected to office.

There are still many clerks who do not properly apprehend the fact that the duly elected officers of a township, village or city form a Board of Health; that the clerks of such townships, villages

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* Copies of this circular for gratuitous distribution may be obtained by addressing the Secretary of the Board.

or cities are, *ex officio*, clerks of such Boards of Health, and that *a report from them is a duty required by law, which duty is wholly independent of any assistance they may receive from the boards* of which they are members, or of the further question, whether such boards have ever assembled in their official capacity as Boards of Health or not.

For the further information of all concerned, we also append the text of the statute in which this duty is required:

"The health physician and the clerk of the Board of Health in every town, city and village, shall each, at least once a year, report to the State Board [of Health] their transactions and such facts as shall be required, upon blanks, and according to instructions furnished, and shall also make special reports when required."

In this connection it may not be improper to say that the writer, while serving in May last as Secretary of the Section on State Medicine, in the American Medical Association, was particularly impressed by the unusual interest that attached to public hygiene in that body, and especially with the importance attached to Boards of Health, both state and local, a fact which he here records as one of encouragement.

It was the experience of all present that never before had the principles of State Medicine been so highly esteemed or so thoroughly appreciated, a very practical indorsement being given to an extract from the memorial of the Provisional Health Commission, which declares that "the future of public hygiene in this country depends mainly upon the proper organization of state and local boards of health, and upon such recognition of their importance and utility by the people and their legislators that the necessary means and powers shall be granted to them which will enable them properly to perform their duties."

Copies of the circulars sent to the clerks of the local health boards, together with the blank upon which the formal annual returns were made, are herewith given. These blanks are furnished to the clerks in duplicate, in order that a copy may be filed in the office from which the report is sent; an examination of such duplicate will greatly facilitate the labors of subsequent officers when called upon to make similar reports, and will also insure greater correctness.

OFFICE OF STATE BOARD OF HEALTH,
APPLETON, *Wis.*, May, 1879.

To the Clerk of the Local Board of Health or the Town, Village or City Clerk:

DEAR SIR: The State Board of Health in asking for the Third Annual Reports from Local Health Boards, a blank for which is herewith enclosed, takes occasion to express its gratification at the fact that not only were the returns made in answer to its Second Annual Circular greatly increased in number as compared with those received in reply to the first circular issued by the Board, but that far greater care had evidently been taken in their preparation. The Board returns sincere thanks to all who have heretofore given evidence of interest in and appreciation of its work, and from whom much information of value in a sanitary point of view has been received, and trusts that all who have as yet omitted to perform the duties legally required of them in its behalf will at once realize the importance of those duties, and acquit themselves of any charge of neglecting their proper performance.

At present the State Board is compelled to rely in very great measure upon these reports for its knowledge of the general sanitary condition of the state and for the means of tracing the march of epidemics within its boundaries, and, while the difficulties of making them are fully appreciated, it is hoped that no pains will be spared in the attempt to render them as full and accurate as the most careful and conscientious effort upon your part can make them.

Chapters 56 and 57, sections 1410 and 1411 of the Revised Statutes, provide that in the absence of any specially appointed Board of Health, the officers of every town, village and city shall be Boards of Health, and shall, as such, *exercise all the powers and* PERFORM ALL THE DUTIES prescribed by law. Under these statutes, *whether there be any local provision or not*, YOU ARE THE CLERK OF THE BOARD OF HEALTH IN YOUR TOWN, VILLAGE OR CITY, and one of the duties devolving on you in that capacity, is "to report at least once a year to the State Board of Health," the transactions of your local board, and "such facts as shall be required, upon blanks and according to instructions furnished," and further, "to make special reports whenever you are required to do so." *This duty the law demands of you absolutely.* Whether the local authorities of your town, village or city have ever assembled and organized as a Board of Health or not, is a question which is not considered in this connection. *The law is explicit, and requires you in virtue of your office to make the proper returns in any case*, and any expenditure for postage, stationery, etc., necessary in connection therewith, is properly chargeable to your official expenses.

Sections 1414, 1415 and 1416 of the Revised Statutes clothe the

Local Health Boards with the most ample powers to do any and every act which may be necessary for the preservation of the public health. They may make any needful rules and regulations, which must be obeyed under heavy penalties; they may enter upon private property and remove or destroy anything there found prejudicial to the health of the community; they may remove any person sick with any contagious or infectious disease, or isolate him in any way or by any means which the circumstances of the case may require; they are, in short, the guardians of public health throughout the state, and have the fullest authority to enforce any measures necessary for the safety of public health in their respective jurisdictions.

With these Local Boards, the State Board of Health desires to co-operate, and the provisions of law above quoted are intended to render such co-operation intelligent and efficient. In accordance with them, you will please fill out the accompanying blank and return it to this office as promptly as possible at the close of the year for which the reports are made. Since the labor of compiling and arranging is very great and consumes much time, it is desired that if possible all returns shall be made by the first of June.

With the blanks sent to your predecessor for previous reports, duplicates were enclosed which he was desired to retain on file in his office; if this were done it will assist you in making your report at this time. A duplicate is sent herewith on which you will please copy the report you now make, the copy to be filed in your office for future reference.

In the circulars of previous years, the appointment of some reputable physician as health officer was urged upon each local board. If such appointment has been made, you are advised to consult with the health officer in preparing your report, particularly with reference to the questions concerning the diseases especially mentioned. Please make special report to this Board of the outbreak or prevalence at any time of any contagious disease in your locality, or of any disease arising from causes believed to be preventable. Any of the circulars issued by this Board giving instructions in regard to such diseases, will be sent to you at your request. Your attention is especially invited to the instructions given in these circulars, by observance of which it is believed that much sickness may be prevented. The wisdom of vaccinating all young children and other unprotected persons for the prevention of small pox, and the eminent propriety of *carefully isolating* ALL CASES OF CONTAGIOUS DISEASE, are so clearly apparent that the Board earnestly hopes to receive your co-operation in impressing the importance of those precautions upon the minds of your neighbors and fellow citizens. Voluntary communication from any member of your Board will always be welcome.

A copy of the third annual report of this Board will shortly be mailed to your address; you are requested to examine it carefully, to render any assistance in your power in carrying out any of the work therein indicated, and to give the report a permanent place in your office for the benefit of future occupants thereof.

By order of the State Board of Health.

J. T. REEVE, M. D.,
Secretary.

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* Please fill every blank and return promptly to J. T. Reeve, M. D., Secretary State Board of Health, Appleton, Wisconsin.

ANNUAL REPORT OF THE CLERK OF THE BOARD OF HEALTH

For the year ending May 31, 1879.

To the Secretary of the State Board of Health:

SIR: The territory for which this report is made includes the corporate limits of the* —— of —— in the county of ——, containing about —— acres of land. Its population numbers about —— inhabitants and is composed chiefly of † ——. Their principal occupation is ——.

About —— of the land included in above limits was originally covered with timber, chiefly ——. About —— still remains covered with timber, and during the last year the timber has been removed from about —— acres. There are now under cultivation about —— acres. The nature of the soil is —— and the crops chiefly raised are ——. It is‡ —— watered by the following streams and bodies of water, to wit:

I estimate the number of acres of low or wet land from swamps, etc., to be now about ——. The proportion of this land which is capable of being efficiently drained is ——, and the number of acres of originally wet or low land that have been thoroughly drained during the last year is about ——.

In this locality the drinking water is derived chiefly from ——, and the quality of the water is § ——; the wells are of the average depth of —— feet.

The proportion of dwellings having cellars which are wet either habitually or in wet weather is ——.

The average distance of privies from dwelling houses is —— feet. The average distance of privies from the source of water supply is —— feet; the least distance in any known case is —— feet.

The diseases which have been most prevalent in this community during the last year have been ——.

Upon the whole, the amount of sickness has been ¶ —— than it has averaged for some years past, and the number of deaths has been ¶ ——.

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* Insert township, village, or city † Give approximate proportion of nationalities represented. ‡ Insert poorly, well, abundantly, etc. § Hard or soft. ¶ Insert greater or less—giving proportion if possible.

There have been in this * ——, during the last year, to the best of my knowledge and belief,

Please fill these blanks with care.

- —— cases of, and —— deaths from *small pox*, and there are now sick with this disease —— cases.
- —— cases of, and —— deaths from *diphtheria*, and there are now sick with this disease —— cases.
- —— cases of, and —— deaths from *scarlet fever*, and there are now sick with this disease —— cases.
- —— cases of, and —— deaths from *typhoid fever*, and there are now sick with this disease —— cases.
- —— cases of, and —— deaths from *measles*, and there are now sick with this disease —— cases.
- —— cases of, and —— deaths from *whooping cough*, and there are now sick with this disease —— cases.

[Please give, on a separate sheet, the origin, where known, of any of these diseases; and the history of any special epidemics, with the means which have been adopted to prevent their spread, with results; also a detailed history of any cases where it is believed that sickness of any kind has been caused by contamination of the water supply.]

The diseases prevailing at the date of this report, other than those above enumerated, are ——.

This Board of Health has appointed Doctor —— as its health physician. His P. O. address is ——. He is paid a salary of $—— per year.

During the past year this Board has held —— regular or special meetings, and its most important acts have been ——.

My post office address is ——.

Dated ——. Signature, —— ——,

Clerk of the Board of Health for the —— of ——, State of Wisconsin.*

Any additional information on matters pertaining to health written on a separate sheet, will be thankfully received — especially on the following points:

Reports of any cases of disease clearly traceable to local causes, such as impurity of drinking water from decomposing animal or vegetable matter, unhealthy food, stagnant water, etc.

Reports of any extraordinary amount of sickness or of unusual fatality in special localities. Instances of spread of contagious diseases in any unusual manner, etc.

Report of cases of sickness or of death, the origin of which is clearly traceable to the occupation of the individuals.

Report of unusual sickness or fatality among animals.

Instances of injury to life or property from kerosene oil or other explosive burning fluids.

Whether there have been any diseases in your locality which might have been prevented by proper hygienic measures.

Your opinion as to the principal sources of danger to the health of the citizens in your locality, and suggestions whereby local causes of disease may be removed, etc.

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* Insert township, village or city.

Please give here your best estimate of the average cost of each case of sickness in your community, including as follows: Medicine and medical attendance, $——. Hired assistance, $——. Loss of time at its fair value, $——. Also the further cost of each funeral in case of death, $——. (Although great accuracy cannot be expected in the answers to this question, your estimate of the above, however imperfect, is nevertheless desired, as having a bearing upon the cost of sickness to communities and to the state.)

The following is an alphabetical list of all the towns, cities and villages which have furnished the annual reports required by the law quoted above, the total number of reports received being 795, against 687 received in 1878, and 556 in 1877. From this list it will be seen that every county in the state is represented in these reports, excepting only that of Bayfield, a county so newly settled that it embraces only a single township. All the townships, villages and cities in the counties of Burnett, Crawford, Dunn, Douglas, Milwaukee, Oconto and Taylor, are represented in the list, while fourteen additional counties lack but one report each of being complete.

Reports have been received from the following towns, for the year ending May 31, 1879:

Adams County. — Adams, Big Flats, Dell Prairie, Easton, Jackson, Lincoln, Monroe, New Chester, Preston, Quincy, Richfield, Rome, Springville.

Ashland County. — Ashland, Butternut.

Barron County. — Barron, Cedar Lake, Clinton, Dallas, Lakeland, Prairie Farm, Rice Lake, Shetek, Stanfold, Sumner.

Brown County. — Allouez, Ashwaubenon, Bellevue, Depere (town), Depere (village), West Depere, Glenmore, Green Bay (town), Holland, Humboldt, New Denmark, Pittsfield, Preble, Rockland, Scott, Suamico, Wrightstown.

Buffalo County.— Alma (town), Belvidere, Buffalo (town), Buffalo (city), Canton, Cross, Dover, Fountain City, Gilmanton, Glencoe, Lincoln, Maxville, Milton, Montana, Naples, Nelson, Waumandee.

Burnett County.— Bashaw, Grantsburg, Marshland, Trade Lake, Wood Lake.

Calumet County.— Brillion, Brothertown, Charlestown, Chilton (city), Harrison, New Holstein, Rantoul, Stockbridge, Woodville.

Chippewa County. — Anson, Auburn, Bloomer, Chippewa Falls, Eagle Point, Edson, Flambeau, La Fayette, Sigel, Wheaton.

Clark County.— Beaver, Colby, Eaton, Fremont, Grant, Hewitt, Lewis, Loyal, Mayville, Mentor, Pine Valley, Sherman, Sherwood Forest, Thorp, Unity, Warner, Weston, York.

Columbia County.— Arlington, Caledonia, Columbus (town), Columbus (city), Courtland, Dekora, Fort Winnebago, Leeds, Lewiston, Lodi, Lowville, Marcellon, Otsego, Pacific, Portage City, Randolph, Scott, Springvale, West Point, Wyocena.

Crawford County. — Bridgeport, Clayton, Eastman, Freeman, Haney, Marietta, Prairie du Chien, Scott, Seneca, Utica, Wauzeka.

Dane County. — Albion, Berry, Black Earth, Blooming Grove, Blue Mounds, Bristol, Christiana, Cottage Grove, Cross Plains, Dane, Deerfield, Dunkirk, Dunn, Fitchburg, Madison (town), Madison (city), Mazomanie, Montrose, Oregon, Perry, Primrose, Rutland, Springdale, Sun Prairie (town), Vermont, Verona, Vienna, Westport, Windsor, York.

Dodge County.— Beaver Dam (town), Beaver Dam (city), Burnett, Calamus, Clyman, Elba, Emmet, Fox Lake, Hubbard, Hustisford, Lebanon, Leroy, Lomira, Lowell, Oak Grove, Portland, Randolph (village), Rubicon, Shields, Theresa, Trenton, Watertown, Waupun, Westford, Williamstown, Juneau (village).

Door County.— Bailey's Harbor, Brussels, Clay Banks, Egg Harbor, Forestville, Gibraltar, Jacksonport, Liberty Grove, Sevastopol, Sturgeon Bay, Union, Washington.

Douglas County.— Superior.

Dunn County. — Colfax, Dunn, Eau Galle, Elk Mound, Grant, Lucas, Menominee, New Haven, Otter Creek, Peru, Red Cedar, Rock Creek, Sand Creek, Sheridan, Sherman, Spring Creek, Stanton, Tainter, Tiffany, Weston.

Eau Claire County.— Augusta, Brunswick, Drammen, Eau Claire, Fairchild, Lincoln, Ludington, Otter Creek, Pleasant Valley, Seymour, Union.

Fond du Lac County.— Auburn, Byron, Calumet, Eden, Eldorado, Empire, Fond du Lac (town), Fond du Lac (city), Friendship, Metomen, Ripon (city), Springvale, Taycheedah.

Grant County. — Beetown, Bloomington, Boscobel, Cassville, Castle Rock, Clifton, Ellenboro, Harrison, Hazel Green, Hickory Grove, Jamestown, Liberty, Little Grant, Marion, Millville, Mt. Hope, Mt. Ida, Paris, Patch Grove, Plattville, Potosi, Smelzer, Waterloo, Wingville, Woodman, Wyalusing.

Green County.— Adams, Albany, Brooklyn, Cadiz, Clarno, Decatur, Exeter, Monroe, Mt. Pleasant, Spring Grove, Sylvester, Washington.

Green Lake County. — Berlin (city), Brooklyn, Green Lake, Kingston, Mackford, Manchester, Princeton, St. Marie, Seneca.

Iowa County. — Clyde, Dodgeville, Eden, Franklin, Highland, Mifflin, Mineral Point (town), Pulaski, Ridgway, Waldwick, Wyoming.

Jackson County.— Albion, Hixton, Manchester, Millston, Northfield, Springfield.

Jefferson County. — Aztalan, Cold Spring, Concord, Farmington, Hebron, Ixonia, Jefferson, Koshkonong, Lake Mills, Milford, Palmyra, Sullivan, Sumner, Waterloo (village), Watertown (town), Watertown (city).

Juneau County. — Armenia, Clearfield, Fountain, Germantown, Kildare, Kingston, Lemonweir, Lindina, Lisbon, Lyndon, Mauston, Necedah, New Lisbon,Orange, Plymouth, Seven Mile Creek, Summit.

Kenosha County. — Bristol, Kenosha, Paris, Randall, Salem, Somers, Wheatland.

Kewaunee County. — Ahnapee (city), Ahnapee (town), Carlton, Casco, Franklin, Kewaunee (village), Kewaunee (town), Krok, Montpelier, Pierce.

La Crosse County. — Bangor, Burns, Campbell, Farmington, Greenfield, Hamilton, Holland, La Crosse, Onalaska, Shelby, Washington.

La Fayette County. — Argyle, Belmont, Benton, Blanchard, Elk Grove, Fayette, Gratiot, New Diggings, Seymour, Shullsburg Wayne, White Oak Spring, Willow Springs, Wiota.

Lincoln County. — Corning, Pine River, Rock Falls.

Manitowoc County.—Cato, Centreville, Cooperstown, Eaton, Gibson, Kossuth, Liberty, Manitowoc (city), Manitowoc Rapids, Maple Grove, Meeme, Mishicott, Newton, Rockland, Schleswig, Two Creeks, Two Rivers (town), Two Rivers (city).

Marathon County. — Hamburg, Holden, Hull, Knowlton, Maine, Marathon, Mosinee, Rib Falls, Spencer, Stettin, Texas, Wausau (town), Wausau (city), Wien, Weston.

Marinette County. — Peshtigo.

Marquette County. — Buffalo, Crystal Lake, Douglas, Harris, Mecan, Montello, Moundville, Neshkoro, Newton, Oxford, Packwaukee, Shields.

Milwaukee County. — Franklin, Granville, Greenfield, Lake, Milwaukee (town), Milwaukee (city), Oak Creek, Wauwatosa.

Monroe County.— Adrian, Angelo, Byron, Clifton, Glendale, Greenfield, La Fayette, La Grange, Leon, Lincoln, Little Falls, New Lyme, Oak Dale, Portland, Ridgeville, Sheldon, Tomah (village), Tomah (town), Wellington, Wilton.

Oconto County.— Gillett, Langdale, Little Suamico, Maple Valley, Oconto (town), Oconto (city), Pensaukee, Stiles.

Outagamie County.— Appleton, Black Creek, Buchanan, Center, Cicero, Dale, Deer Creek, Ellington, Freedom, Grand Chute, Green Creek, Hortonia, Liberty, Maine, Maple Creek, Osborne, Seymour (town), Seymour (city).

Ozaukee County. — Belgium, Cedarburg, Fredonia, Grafton, Port Washington, Saukville.

Pepin County.— Albany, Durand (village), Frankfort, Lima, Stockholm, Waterville, Waubeck.

Pierce County.— Clifton, Diamond Bluff, El Paso, Gilman, Hartland, Isabella, Maiden Rock, Martell, Oak Grove, Prescott, River Falls, Rock Elm, Salem, Spring Lake, Trenton, Trimbelle, Union.

Polk County.— Alden, Apple River, Balsam Lake, Black Brook, Clam Falls, Clayton, Farmington, Georgetown, Laketown, Lincoln, Lorraine, Luck, Milltown, Osceola, St. Croix Falls, Sterling, West Sweden.

Price County.— Branon.

Portage County. — Alban, Amherst, Belmont, Eau Pleine, Grant, Hull, Linwood, New Hope, Pine Grove, Plover, Sharon, Stevens Point (town), Stevens Point (city), Stockton.

Racine County.— Burlington, Caledonia, Dover, Mt. Pleasant, Norway, Racine, Raymond, Waterford, Yorkville.

Richland County.— Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Onion, Richland Centre (village), Richwood, Rockbridge, Willow.

Rock County. — Avon, Beloit (town), Bradford, Centre, Clinton, Fulton, Harmony, Janesville (town), Johnstown, La Prairie, Lima, Magnolia, Milton, Newark, Plymouth, Porter, Rock, Spring Valley, Turtle.

St. Croix County.— Baldwin, Cady, Cylon, Eau Galle, Emerald, Hammond, Hudson (town), Hudson (city), Kinnickinnic, Pleasant Valley, New Richmond (village), Rush River, Star Prairie, Somerset, Springfield, Stanton, St. Joseph, Troy, Warren.

Sauk County.— Baraboo, Bear Creek, Dellona, Delton, Excelsior, Franklin, Freedom, Greenfield, Honey Creek, Ironton, Lavalle, Merrimack, Prairie du Sac, Reedsburg, Spring Green (town), Spring Green (village), Sumpter, Troy, Washington, Westfield.

Shawano County.— Almon, Angelica, Belle Plaine, Fairbanks, Green Valley, Grant, Hartland, Herman, Howe, Lesser, Maple Grove, Navarino, Pella, Richmond, Seneca, Waukechon.

Sheboygan County. — Greenbush, Hermann, Holland, Lima, Mitchell, Mosel, Plymouth (town), Rhine, Sheboygan (town), Sheboygan (city), Sheboygan Falls (town), Sheboygan Falls (village), Sherman, Wilson.

Taylor County.— Chelsea, Little Black, Medford, Westboro.

Trempealeau County.— Albion, Arcadia, Burnside, Caledonia, Dodge, Ettrick, Hale, Lincoln, Preston, Pigeon, Sumner, Trempealeau, Unity.

Vernon County.— Bergen, Christiana, Clinton, Coon, Forest, Franklin, Genoa, Greenwood, Hamburg, Hillsboro, Kickapoo, Liberty, Stark, Sterling, Viroqua, Webster, Wheatland, Whitestown.

Walworth County. — Bloomfield, Darien, Delavan, East Troy, Elkhorn, Geneva, La Fayette, La Grange, Linn, Richmond, Spring Prairie, Sugar Creek, Troy, Walworth, Whitewater.

Washington County.— Addison, Barton, Erin, Farmington, Germantown, Hartford, Jackson, Kewaskum, Polk, Richfield, Schleisingerville, Trenton, West Bend (village).

Waukesha County. — Brookfield, Eagle, Lisbon, Mukwanago, Muskego, New Berlin, Ottawa, Oconomowoc (town), Summit, Vernon, Waukesha (town), Waukesha (village).

Waupaca County.— Bear Creek, Caledonia, Dayton, Dupont, Farmington, Fremont, Helvetia, Larrabee, Lind, Little Wolf, Matteson, Royalton, St. Lawrence, Scandinavia, Union, Waupaca (town), Weyauwega.

Waushara County.— Aurora, Coloma, Dakota, Deerfield, Hancock, Marion, Mt. Morris, Oasis, Plainfield, Poysippi, Richford, Rose, Saxville, Springwater.

Winnebago County.— Algoma, Black Wolf, Clayton, Menasha (town), Menasha (city), Neenah (town), Nekimi, Nepeuskun, Omro, Oshkosh (town), Oshkosh (city), Rushford, Utica, Vinland, Winchester, Winneconne, Wolf River.

Wood County.— Auburndale, Centralia (city), Grand Rapids (town), Lincoln, Marshfield, Port Edwards, Remington, Rock, Seneca, Wood.

An especially gratifying feature in these reports is, that in a number of them are to be found evidences of a growing sense of responsibility on the part of local health boards. Thus, in two cases, we find it stated that the boards have held special meetings for the purpose of doing away with offensive slaughter houses; in others, that such meetings have been frequently called to consider the best means of suppressing various nuisances, while in several, the complaint is made that the local boards failed to take such action, even though it was imperatively demanded. It is hoped that each succeeding year will bring an increased number of records of similar action by the boards, and a corresponding diminution of reports of sickness from causes wholly under their control.

The reports from thirty of the above localities are so imperfect or defective that no information of value has been derived from them concerning the diseases from which they have suffered. From the remaining seven hundred and sixty-five places, we have the following information concerning the amount of sickness and mortality from each of the following diseases: Small-pox, diphtheria, scarlet fever, typhoid fever, measles, and whooping cough.

In one hundred and forty localities, not one of them has appeared during the year for which the report is made; in one hundred and ninety-two other localities, one only has occurred; one hundred and eighty-nine report the presence of two, and one hundred and thirty-eight have suffered from three of these diseases; in sixty-nine towns, four, and in thirty-three, five of them have prevailed, while one single township only reports that it has been afflicted with all.

These returns further show an increase of diphtheria, but a diminution of all the other diseases named, the greater number of towns making returns being taken into consideration, but it would appear that measles and whooping cough have been more severe in type, the ratio of mortality from them being larger.

The following tabular statement shows the actual number of localities in which each of these diseases has appeared during the year, the number of cases of each disease, and the number of deaths resulting therefrom, according to the official reports given by the clerks of the local health boards.*

	Small Pox.	Diphtheria.	Scarlet Fever.	Typhoid Fever.	Measles.	Whooping Cough.
Number of towns reporting	8	395	232	247	255	259
Whole number of cases....	62	8,488	3,157	1,430	8,270	6,636
Whole number of deaths reported................	27	1,234	377	274	114	160

It will be remembered that the diseases we are considering are classed as "preventable diseases." Possibly it would be difficult to convince the public that they are entirely so, yet it will doubtless be readily admitted that they are among those most easily to be prevented by careful avoidance of exposure, and by excellence of sanitary surroundings. It will be profitable, therefore, to inquire what these six diseases are costing the people in cash, and to this end we give a calculation based on the estimates made by one hundred and twenty-one clerks of local health boards, as follows: These cases of sickness have cost, including medical attendance, medicines, value of time necessarily lost on account of illness, and cost of extra help needed by reason of the same, the sum of two million, two hundred and twenty-seven thousand, seven hundred and thirty five dollars and ninety-two cents, and adding to this the sum of sixty-seven thousand one hundred and seventy-five dollars and seventy-eight cents, the further estimate of the cost of burying the dead, and we have the astonishing sum of two million, two hundred and ninety-four thousand, nine hundred and eleven dollars and seventy cents, as the amount expended in about seven-eighths of the whole state, on account of sickness from these six diseases only.

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* In this table, the only change made in the official figures is as follows: From thirty-five localities, the reports made give only the deaths from the above named diseases, without specifying the number of cases of sickness therefrom. We have assumed that the ratio of mortality was uniform in all the localities reporting, and having ascertained this ratio from the remaining 760 reports, we attached the same estimate to those reports in which the number of deaths only was given.

It will be remembered that this estimate is not ours, but has been obtained by taking the averaged estimates of 121 different men in widely separated localities all over the state.

It may, indeed, be fairly said to represent the opinion of the people themselves upon the cost to them of the diseases under discussion, for the individuals from whose answers the sums above given have been derived are unquestionably men who adequately represent the average of their respective communities, and whose opportunities are, to speak very moderately, reasonably good for forming a just and correct opinion as to the amounts of the items represented. It will be observed that these estimates greatly exceed those presented in our last report, and fully bear out the opinion then expressed, to wit, that we had "stated the cost to the people of the above mentioned diseases at a much lower figure than the truth would warrant us in doing." Comparing the sum then presented, which was based upon the opinion of one or two persons only, with that now given, which is based upon careful estimates made by more than one hundred men, all of whom are in positions which enable them to form very accurate conclusions, the first sum is seen to be wholly inadequate.

We have no data whatever by which to show what proportion *the sickness from* these diseases bears to the sickness from all diseases, but, assuming it to be less than one-fourth, we may begin to comprehend what an enormous tax is imposed upon the people by sickness.

In all that has been said, moreover, it is to be noted that reference has been made only to the sums necessarily spent by individuals, families, etc., no account having been taken of the loss to the commonwealth which results from the withdrawal of a number of workers from productive labor, or of the further absolute loss involved in the death of an able-bodied laborer — a loss augmented in a rapidly increasing ratio with the higher grades of the work which the individual was capable of performing.

Another point worthy of notice is, that the huge expenditure noted * has occurred during a year in which, notwithstanding the prevalence of one or two diseases, there is no evidence that the aggregate amount of sickness and death has been at all greater than is usual.

LOCAL HEALTH OFFICERS.

It is to be regretted that we have no evidence of any satisfactory increase in the number of health officers appointed since the date of our last report. The number of which we have positive knowledge is 167, an increase of 37 only over the number reported last year.

The position of health officer is a most important one, and, if the proper person be selected to fill it, one of the greatest practical usefulness in any community, large or small. He can do much toward preventing, altogether, outbreaks of epidemics, restricting the spread of contagious diseases; and not only these, but it is in his power to do much toward the prevention of sickness and suffering from many diseases that are neither epidemic or contagious. He should be able to give valuable advice to his fellow citizens upon the means whereby their dwellings may be made more secure against the invasion of sickness, whether by means of foul air, polluted water, or any other of the now well-known channels by which it usually obtains access.

To his charge should be committed the important matters of the

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* The sum is greater, by nearly $75,000, than the whole amount raised by taxation in the state of Wisconsin, in 1877, for school purposes, including county, town and district taxes.

isolation of those sick from contagious disease, and the care and disinfection of the houses and rooms occupied by them, after recovery or death. He should also have the supervision of the public schools as regards the appearance of infectious disorders in them, and with him should rest the power of deciding upon the proper time of re-admission, in the case of pupils who have been temporarily excluded, either by reason of having suffered from such maladies in their own persons, or because of exposure to them by reason of their occurrence in the same households.

A single feature drawn from the reports of clerks of local health boards will illustrate the need that exists for a competent sanitary advisor in every town in Wisconsin, i. e., the frequency with which there are found in the same reports, statements that the average distance of privies from sources of domestic water supply does not exceed thirty or forty feet, and that an unusual number of cases of diphtheria and typhoid fever had occurred. It is not asserted that these stand in the relation to each other of cause and effect; we note the fact as corroborative of many similar facts observed and reported from other sources, and present it as a matter worthy the most careful attention and the closest investigation on the part of local health boards — an attention and investigation which it can receive from no one so well as from skilled and cautious executive officers acting under the instructions of such boards. Quite apart, however, from the question of such an investigation, is the fact of the existence of many wells and privies in close and undue proximity to each other, and the further fact, that a health officer in every town could occupy a part of his time in the inspection and condemnation of these and many other such "nuisances, sources of filth or causes of sickness," with advantage to all concerned.

We may add that common prudence would dictate the placing of the privy, in all cases, at such a distance from the well as to preclude all possible chance of mischief by reason of infiltration from one to the other, or, in case there should be any difficulty in so doing, the abandonment of the privy altogether and the substitution of some form of the earth closet.

It will thus be seen that there is but little force in the plea, often urged, that a town, city or village is so healthy that there is no need of a health officer. In former reports, we have endeavored to show that there is an abundant field for the labors of a competent sanitary officer in every community in the state, and increased knowledge has only strengthened our conviction of the truth of this position.

From the health officers already appointed in various parts of the state, the secretary has to acknowledge the receipt of many valuable communications, extracts from some of which will be found with those from special correspondents. Others, from which nothing has been taken for publication, yet gave information of value to the Board in the prosecution of its work.

SPECIAL CORRESPONDENTS.

Especial thanks are due to our corps of correspondents, whose communications, during the past year, have been of unusual interest and value, a fact well attested by the extracts from them which have been selected for publication. There are yet many portions of the state with which we desire to establish relations by means of these co-laborers, and we cordially invite correspondence from any who are interested in our work, or who have any suggestions to offer in relation thereto.

A copy of the following circular was sent to each of those who have accepted the position of correspondent to the Board, and also to each health physician of whom the Board had knowledge throughout the state, in July or August last.

OFFICE OF THE STATE BOARD OF HEALTH.
APPLETON, WIS., *July*, 1879.

DR. ——— ———:

DEAR SIR: The State Board of Health desires to acknowledge gratefully the interest hitherto shown in its work by its special correspondents, the communications from whom have been of great interest and value to the Board. Besides contributing materially to a knowledge of the sanitary conditions prevailing throughout the state, extracts from these communications have heretofore formed an interesting and valuable feature of the annual reports of the Board.

The Board desires again to obtain from you information upon subjects of sanitary interest relating to the locality in which you reside. Information relating to the prevalence of any special malarial diseases in your neighborhood during the past year would be of value at the present time, as also would reports upon diphtheria, measles and whooping cough, all of which seem to have occurred with unusual frequency in many parts of the state during the past winter and spring, especially of cases in which those diseases could be traced to any local unsanitary conditions, or in which there is reason to suppose that such conditions added to their severity.

The Board has undertaken a somewhat extended investigation into the sanitary conditions of our public school buildings, and of the work done in them, and its effects upon the health of the children. Any information bearing upon these subjects is also desirable, especially information relating to the location of such buildings, with reference to unhealthful surroundings; lack of proper drainage of the buildings or their sites; to defects of construction, furniture, seating arrangements, ventilation, warming, lighting, etc.; to injury arising from over-crowding, from lack of proper protection from the weather, from badly constructed or improperly placed outhouses, or from lack of proper care of these structures, from overwork or attendance at too early an age, or generally from any causes incident to school work, and to the dissemination of contagious diseases in schools by reason of the lack of proper precautions.

It is not desired by the Board that you should limit yourself to the subjects suggested above; *any information* which you may deem of interest or worthy of consideration, will be welcome, and should you so specify, your communication will be regarded as confidential so far as the publication of extracts therefrom, or of the name of the writer, is concerned.

Please forward your reply to this office as soon as possible, using the enclosed envelope for that purpose, and leaving any balance of postage to be paid here.

Very respectfully yours,
J. T. REEVE, M. D.,
Secretary.

ANNUAL REPORTS.

Eight thousand copies of the third annual report were printed and distributed as heretofore. Liberal as this edition seems, a much larger one could be judiciously circulated, the requests for copies of the report from many localities having been very numerous. These requests give gratifying evidence of the estimation in which the work of this Board is held by the people of the state.

In addition to the full report, separate reprints of some of the articles which formed a part of it were found necessary to meet *special demands* for individual papers.

THE PRESS.

It was with great pleasure that we observed the supplementing of the already wide circulation of our report by the republication of some entire articles, and of liberal extracts from others, in many newspapers throughout the state. It becomes our pleasant duty to return especial and hearty thanks to the press of Wisconsin, for its general and "frequent friendly utterances in regard to sanitary science," and for the many kindly and appreciative notices of the work of the Board which have been given from time to time.

THE LIBRARY.

The library of the Board at the date of the last report contained 415 books and pamphlets, of which by far the larger part were gifts from other organizations and from individuals. Since that time the library has been enriched by the receipt and addition of the following books and pamphlets:

Gifts. — Transactions of the Department of Agriculture of the State of Illinois, for 1877, Vol. XV, from S. D. Fisher, Esq., secretary; Transactions of the State Medical Society of West Virginia, for 1878, from M. F. Hullihen, M. D., secretary; Contagious and Epidemic Diseases, considered with reference to Quarantine and Sanitary Laws, by C. W. Chancellor, M. D., from the author; Annual Report of the Board of Managers of the Maryland Hospital for the Insane, 1878, from C. W. Chancellor, M. D.; Reports and Resolutions relating to Sanitary Legislation, presented to American Public Health Association, November, 1878; Annual Report of the Health Officer of the District of Columbia, for 1878, from Smith Townshend, M. D., health officer; Revised Statutes of the State of Wisconsin, from Hon. W. E. Smith, governor; Sixth Annual Report of the State Board of Health of Michigan, from H. B. Baker, M. D., secretary; Circular on Restriction and Prevention of Diphtheria, issued by the State Board of Health of the State of Michigan, from H. B. Baker, M. D., secretary; First Annual Report of the State Board of Health, Ill., from A. L. Clark, M. D., secretary; Circular on Crops of 1878, Ill., from S. D. Fisher, Esq., secretary; First Annual Report of the Commissioner of Health of the City of Milwaukee, from O. W. Wight, M. D., commissioner; Report of Board of Health and City Physician of Concord, N. H., for 1878, from G. P. Conn, M. D., health officer; Eighth Annual Report of the N. Y. Ear Dispensary, from S. Sexton, M. D., secretary; Second Annual Report of the Board of Health, State of New Jersey, from E. M. Hunt, M. D., secretary; First Annual Report of the Board of Health, State of Connecticut, from C. W. Chamberlain, M. D., secretary; Nineteenth Annual Report of Trustees of the State Hospital for the Insane, 1878, from D. F. Boughton, M. D., superintendent; Annual Report of Trustees of the Northern Hospital for the Insane, 1878, from W. Kempster, M. D., superintendent; Annual Report of the State Geological Survey of Wisconsin, 1878, from T. W. Chamberlin, chief geologist; Sixth Annual Report of the Board of Health of the City of New Haven, Conn., from C. A. Lindsley, M. D., health officer; Third Annual Report of the Board of Health of the City of Utica, N. Y., from J. G. Hunt, M. D., health officer; Geological Survey of the State of Wisconsin, Vol. II, with accompanying maps, from Hon. W. Wall; First Annual Report of the Board of Health of the State of Rhode Island, from the Board; Report of Investigations into the Pathogeny of Diphtheria, by Drs. Curtis and Satterthwaite, from Col. Emmons Clark, Secretary Metropolitan Board of Health, N. Y. City; Report on Water of Ludlow Reservoir, Mass.; Report on Peculiar Condition of Water Supply of the City of Boston, Mass.; on the Present Condition of Certain Massachusetts Rivers; Report on Microscopic Vegetation, Contaminating the Waters of Ponds, etc.; on the Water Supply of the Kingdom of Wurtemberg; Report on the Water Supply of the City of Boston, Mass.; Report on the Water Supply of Springfield, Mass.; Chemical Examination of Sewer Air; Composition of the Ground Atmosphere; Observations on the Composition of the Ground Atmosphere in the Vicinity of Organic Matter, by Prof. W. Ripley Nichols, Mass.; Technological Institute, from the Author; 1st Annual Report State Board of Health, Connecticut, additional copies; 9th Annual Report of the State Board of Health, from the Secretary; 7th Annual Report of the State Board of Health, Minnesota; Report of the State Auditor, Minnesota; Report of Vital Statistics, State of Minnesota, from the Secretary of State; Report of the Board of Health and Vital Statistics, Hudson County, New Jersey, from the Clerk; Report of the Board of State Charities and Reform of Wisconsin, 8th Annual, from the Board; Report of the State Board of Health of Louisana, for 1878, from B. F. Taylor, M. D., Secretary; Annual Report of the Health Officer of the District of Columbia, from S. Townshend, M. D., Health Officer; Annual Report of the Superintendent of the North Carolina Insane Asylum for 1879, from E. Grissom, M. D., Superintendent; Domestic Sanitation, a report accepted by the New Orleans Auxiliary Sanitary Association, from C. B. White, M. D., Sanitary Inspector; Good Health for March and May, 1879; Description of the Sanitarium, at Battle Creek, Michigan, and Address of Mrs. White at the Sanitarium, from A. L. Packard, Esq.; State Medicine in its Relations to Insanity; The Prevention of Disease, Insanity, Crime and Pauperism; The Normal Standard of Woman for Propagation; and Studies on the Laws of Life, by Nathan Allen, M. D., Lowell, Mass., from the Author; The Annual Report of the Board of Health of the City of Richmond, Va., for 1878, from J. G. Cabell, M. D., President; Transactions of the Northern Wisconsin Agricultural and Mechanical Association, Vols. III, IV and V, for the years 1875–'78, from R. S. Torrey, Esq., Secretary; The Duties of the Medical Profession concerning Prostitution and its Allied Vices, by F. H. Gerrish. M. D., from the Author; Circulars on the Care of Young Children and on Drainage, issued by the State Board of Health, Mass., from C. F. Folsom, M. D. Secretary; The Education of Girls as connected with Growth and Physical Development, by Nathan Allen, M. D., from the Author; 5th Annual Abstract of Statistical Information relating to the Insane, Deaf, Dumb and Blind, in the State of Michigan, from J. K. Allen, Esq.; 1st Annual Report of the State Board of Health of Kentucky, from N. J. Sawyier, M. D., Secretary; 7th Annual Report of the Board of Health of the City of Boston, from the Board; Report of the U. S. Commissioner of Education for 1877, from the Commissioner; Investigation of Diseases of Swine, from Hon. W. G. LeDuc, Commissioner of Agriculture; 3d Annual Report of the Board of Health of the City of Nashville, from J. Berrien Lindsley, M. D., Health Officer; Annual Reports of the Boards of Education, with Courses of Study, Rules and Regulations, Catalogues, etc., from Cities of Milwaukee, 1878; Madison, 1878; Fort Howard, 1878–'79; Oshkosh, 1878–'79; Portage, 1878; Fond du Lac, 1875–'76; Beaver Dam, 1875–'76; Green Bay, 1874–'75; State Normal Schools at Oshkosh, 1877–'78 and 1878–'79; Platteville, 1877–'78; Whitewater,'78–'79; Cities of Appleton, 1879–'80; Berlin, 1879; Eau Claire, 1876; La Crosse, 1877–78 and '78–'79; Prairie du Chien, 1878; Watertown, 1877–'78; Transactions of the Medical Association of the State of Maine, 1879, from C. O. Hunt, M. D., Secretary; Transactions of the College of Physicians of Philadelphia, 3d Series, Vol. 4, 1879, from the College.

Books Purchased. — Richardson's Health and Occupation; Bernay's Foods; Squibb's Food Adulterations; Summer and its Diseases; Burnett's Hearing and How to Keep it; Richardson's Long Life and How to Reach it; Smith's Diseases of Young Children; Schutzenberger on Fermentations; Naquet's Legal Chemistry; Fleming's Healthy Houses; McSherry's Health and How to Promote it; Health Primers, 6 vols.; Hampden Health Tracts, 5 Nos.; Report Metropolitan Board of Health, 1869; Bloxam's Chemistry; Buck's Hygiene, 2 vols.; MacDonald's Water Analysis; Hassall's Food and Its Adulterations; Quetelet's Probabilities; Lectures on Public Health; Subscriptions to Public Health; and Wisconsin Journal of Education.

EXPENSES.

The expenditures of the present year to date are shown in detail by the vouchers numbered from 179 to 233 inclusive, the several items of which are classified as follows:

Official expenses of members	$373 58
Postage and box rent	500 00
Printing and stationery	465 72
Books and instruments	74 66
Secretary	1,350 00
Clerical services	225 00
Chemicals chemical analyses, etc	92 47
Office furniture	38 50
Sanitary council	10 00
Express charges	57 75
Telegraphing	6 18
Miscellaneous, including freight, etc	49 94
	$3,243 80

CONCLUSION.

In conclusion, the secretary calls attention to the increasing evidence that the work of the Board is reaching the people, for whose benefit the Board was established. This is manifested in part by the numerous communications received at this office, in which the advice and help of the Board is asked in sanitary matters affecting the rights and duties of individuals or communities. Local boards of health have, in several instances, desired instruction on points that have arisen in the discharge of their legitimate duties, and teachers have appealed to us for advice in matters affecting the sanitary conditions of their pupils. In still other cases, the Board or some of its members have been asked to inspect unsanitary localities, and suggest means for remedying existing evils.

In many instances samples of illuminating oils have been sent to this office with the request that they should be subjected to proper tests to determine the question of their explosive or nonexplosive character — such samples being taken in many cases from packages from which lamps that had exploded in actual use had been filled. Each of these cases received careful attention, followed by such report or action as its nature seemed to demand.

Through a large part of the year Prof. T. W. Chittenden has been associated with the Secretary in the varied duties of this office, the increasing weight of which has been greatly lightened by his efficient services.

Very respectfully, J. T. REEVE, M. D.,
Secretary.

HOMES FOR THE PEOPLE.

BY GEN. JAMES BINTLIFF, OF DARLINGTON.

This is an all-important subject, and one which can only be approximately dealt with in a brief paper, such as is now offered; the writer will, therefore, confine his attention mainly to the position and construction of dwellings, although other questions arise and are glanced at incidentally.

POSITION OF DWELLING.

Homes for the people are largely determined by circumstances beyond individual control. In all historic time, commercial facilities have located centres of population; and, in all probability, will continue to do so forever, so that it is fortunate for the human family that unhealthy conditions of soil, water and air, are capable of great modification by means within human control. The city of Chicago, which is built upon land much of which was formerly overflowed during periods of high water, is now, so far as returns and computations of population can be relied on, in fair hygienic condition. It is claimed by the health department of that city, in the comparative table 1868 to 1878, a term of eleven years, that the average of deaths has been reduced from 23.74 in the 1,000 population in 1868, to 16.50 in the 1,000 in 1878. These figures are so extremely favorable as to the progress of sanitary reform, that they suggest reasonable doubts as to the reliability of the data. The statement of the number of deaths is, doubtless, accurate; but the increase of population from 252,054 in 1868 to 450,000 in 1878, is open to doubt, more especially when it is borne in mind that no enumeration of the population of that city has been made since the state census of 1875. The school census and computed ratios of increase cannot be accepted as conclusive; and one feature in the estimate which considerably abates its value, is the fact that a large percentage of the enumeration is based upon a moving or fugitive population, the mortality risks of which have appeared elsewhere. The value of the mortality statistics of cities would be immensely increased by a separation of the transient from the resident population, and by a division of the more and less healthful districts, so as to indicate the imminence of necessities for hygienic improvement in each locality.

Positions at one time salubrious, grow less and less healthful every year, unless means are continuously employed to maintain hygienic conditions. No more apt illustration of that fact need be sought, than is furnished by the city of Boston, in its table of mortality in children. During ten years from 1820, the deaths of children under one year old was a fraction under 9 per cent. per annum of the gross total of deaths. The succeeding decade from 1830 registered an increase to 12.66 per cent. That from 1840 showed a small deterioration of vital force, making the figures 12.76 per cent. The next ten years, commencing with 1850, developed infant mortality to an amount nearly two-fold of the average of the preceding decade, or 23.84 per cent.; which increased to 25.40 during the ten years from 1865, and has since that time varied but little, ranging from 28.19 in the worst single year, to 23.9 in the most favorable, down to 1877. During the same term of years the percentage of deaths under five years of age increased from 26.69 per cent. to 40.94; the highest average being in the decade commencing with 1850, and reaching 46.49 per cent. Greater densities of population, the permeation of buildings with poisonous exhalations inseparable from occupation where adequate ventilation is not provided, and the contamination of the soil from the lack of drainage or from imperfect drainage, are doubtless answerable for the indicated increase of the death rate among children. Boston compares favorably even now with the large percentages of infant mortality enumerated in New York City, Cincinnati and Cleveland; as in the first named city, from 1866 to 1872, the mean of deaths under one year was 30.5 per cent., and of deaths under five was *50 per cent. In* Cincinnati, during seven years ending with 1873, the mean of deaths under one year was 25.5, and under five years 48.1, while in one year, 1869, deaths under five reached the terrible aggregate of 51 per cent. In Cleveland, also, deaths under one year, in 1873, after deducting still-births, amounted to 29.5, and under five to 49.1. The latter figures are quoted to relieve Boston from being regarded as phenomenally unhealthy; the main point being to show that, under ordinary circumstances, increased density of population tends toward an increased rate of mortality, whatever may have been the original advantages of position. With the methods of building which generally obtain, the area over which population is spread is found affecting the death rate with great regularity.

In the year 1857, the annual death rate for the rural districts of England and Wales was 17 per 1,000 of the population, the aggregate being 9,750,000 people, distributed over 350,000,000 acres, giving nearly 36 acres to each person; during the same year the mortality in towns and cities among a population aggregating 8,250,000, located on lands amounting in all to 2,150,000 acres, or rather less than four persons to one acre, was 25 per 1,000, or on the total number from overcrowding alone, an aggregate of 68,000 preventable deaths per annum. The same law of an increasing death rate resultant from overcrowding, was illustrated during the cholera year, 1854, in the same countries. There were 134 districts in which the population averaged 915 persons to the square mile; 404 districts in which the density of the population was only 225 to the square mile; and 85 districts in which there were only 122 persons to the square mile. The death rate from cholera was *nil* in the 85 districts sparsely peopled; 7 in the 10,000 where the population was 225 to the square mile; and more than nine times that number, or 65 in 10,000, in the more densely peopled districts. The bearing of such figures can hardly be questioned.

We do not from these startling results arrive at the conclusion that city life is *per se* destructive to vitality. There are already abundant statistics to render any such idea impossible, for the well-informed mind; and whenever the tables of mortality for cities shall be compiled on plans adapted to show the health and life rates obtaining in different localities, more and less favored by position, by construction and ventilation of buildings, by area of breathing room, by efficient sewerage and by meteorological conditions, we shall find a much more effective reply to such a conclusion. Some of the best results recorded as to vitality are found in towns, and may be illustrated by a few figures submitted to the Social Science Association by Mr. Michael, the mayor of Swansea, Wales. That gentleman caused the vital statistics of Swansea to be divided according to the respective densities of population; and he found the A division, resident in superior houses, apart from each other, or standing on their own grounds, subject to a mortality of only 11 in the 1,000 per annum; while the C division suffered a mortality of 36, or nearly 3¼ the minimum; and the intermediate density lost 20 in the 1,000, or 9 more than the A division. It is claimed by some writers that the human race would be extinguished in less than two centuries if confined to large cities; but, manifestly, that would depend upon the conditions by which they were surrounded, as the Swansea A division compares favorably with suburban vitality, and there is no reason known among men, why every man, woman and child should not have a never failing supply of pure air.

London shows an aggregate of 10,000 deaths per annum in excess of births, but there are parts of London that are as favorable to longevity as those occupied by the A division at Swansea; and in the worst cities, hygienically considered, length of life is found dependent upon individual action, in a very great degree. For very many centuries the Jews were systematically persecuted by governments and people all over Europe, condemned to live in particular quarters in all the principal cities, and robbed without scruple by the ruling class if they were so ill-advised as to make a show of comfort or wealth. Under such and manifold other disadvantages, they adhered more or less strictly to the rules of life with reference to personal purification, laid down for them of old time, and we find them leading the whole human race to-day in the essentials of vitality. Prussian statistics show that the mortality per year among 100,000 Jews, is less by 800 than the deaths in the same term among the same number of Christians; the numbers being *2,161 Jews to* 2,961 Christians; and in every particular the chosen people manifest greater powers of endurance. A few results obtained from 100,000 on each side, will show how complete and advantageous is the contrast favoring the Jews. There were among the Christians 143 still births; among the Jews, 89; a difference of 54 to our disadvantage. It might be supposed that the decreased number of still-births would be offset by a larger average of weakness in the offspring of Israel; but precisely the reverse is the fact, as only 453 children of that race die under one year, while 697, or more than 50 per cent. above the Jewish average, die in the first year out of the aggregate of Christian births. In the four years next ensuing, 386 Jewish children die; the offspring of Christians, already much smaller in number, still heading the death rate by nearly 25 per cent., the numbers being 477. From five years old to fourteen, 151 children of the Jewish race fall out of the ranks, and one-third more, or 202 Christian children, die. From that age until twenty-five the Jews lose 125; the Christians 155.

During the twenty years ending at 45, there is a loss among the Jews of 231, and among the Christians of 334, or 103 in excess. So marked was the exemption of the Jews from the plagues that decimated all nations during the middle ages, that they were charged with having poisoned wells and springs, and only active interference on the part of the authorities prevented a general massacre of the cleanliest people on the continent. These illustrations show the potency of their modes of life in warding off maladies, as well as sustain the proposition that men may make city life conduce to comfort and longevity by wisely controlling circumstances. Men need not fall victims to epidemics, although surrounded by evil conditions, unless they allow their physical systems to become weakened and their minds to sink into demoralization. Neither of these undesirable habits of mind and body were to be feared in the bright intellects and self-poised courage of that eminently deserving people, the Jews. Town life is not necessarily more brief nor less healthful than life in the country. The conditions of longevity can be fulfilled in one location as well as the other. In New York, in 1872, while one half million showed a mortality of 21,550, the other half million suffered little more than half that number of bereavals, the actual figures being 11,097. The fatal errors which cause this distinction are such as society can, in the future, prevent. Dr. Grunhow, an eminent hygienist, submitted to the local science association before mentioned, a valuable paper contrasting the mortality of Glendale, a healthy rural district in England, with the different commercial and manufacturing towns, and the figures are peculiarly instructive as to the work which remains to be accomplished, if town life is to become, in the large sense, as applying to the mass, compatible with health and vigor.

In Glendale, the rate of mortality observed during many years, was 15.09 per 1,000, and in Liverpool, 36.35. In Liverpool the losses from pulmonary affections amounted to 1,000 in 100,000, to 216 in Glendale. In Glendale 40 children died of nervous diseases out of 100,000 population, and in Manchester 393, or nearly ten to one. Diarrhœal diseases, for many years in succession, in Glendale, carried off 57 infants, in a population of 100,000; and in Manchester, 1,945. Assuming a very moderate estimate of fourteen cases of sickness and prostration for each death, it will be seen at once that an enormous aggregate of preventable suffering and loss grows out of neglected hygiene. There is a terrible account to be squared between what is known to the rulers of mankind, and what is the rule among the masses, when instead of the normal death rate of 11 in the 1,000, in some of the worst streets of our large cities, the death rate ranges from 35 to 90, with an average of 55. Alarmists answer the worst facts in town and city mortality by prescribing the abandonment of city life; but to advocate such a course, is to be less wise than a child crying for the moon. A large percentage of mankind must live by commerce and manufactures. From the early beginnings of modern social life, in all prosperous countries, the law of gravitation toward centres of population has been increasing in power. In 1790, more than 94 per cent. of the population of the United States lived in the rural districts. That ratio was reduced to about 91 per cent. in 1840, and to 79 per cent. at the commencement of this decade — the momentum towards city and town life steadily increasing to keep pace with commercial *and manufacturing* necessities.

In England 56 per cent. of the population live in towns and cities; and, in this country, we are steadily moving toward a similar result.

To meet the demands for improved conditions of life which this tendency creates, the popular mind must be instructed in a knowledge of those laws which govern the community for health or disease, supplemented by legislation in favor of a liberal minimum of space and breathing room for every dweller in towns; by cheap railroad transportation for the diffusion of town population in the suburbs of large centres, by authority conferred on boards of health to enforce the observance of hygienic law in the habitation of existing houses, where they are fit to be used as dwellings, and in their compulsory removal where they are unfit for human needs; and in procuring the observance of needful regulations in the erection of all new buildings. To allow our present system of living — or only half living, at the best — to continue, is to legitimatize the decimation of the people, and to give the approval of concurrence to infanticide and murder. The power and dignity of the state is involved in the physical and mental welfare of each member of the community; and no more important subject can claim the attention of legislators than that of providing the means by which these ends can best be secured.

CONSTRUCTION OF DWELLINGS.

The differences in value between town life and country life, in the main, are due to overcrowding in dwellings and to the crowding of dwellings themselves, so that the atmosphere and the soil cannot discharge their offices in surrounding living bodies with purifying influences. The practical work of boards of health must almost always be limited to the improvement of existing conditions; and yet, there are independent movements in other directions, which give large promise of efficient aid in reaching the same results for which health officers are laboring and which are deserving of the highest commendation. Among these is the effort instituted by Mr. Wasson, of Detroit, who is advantageously employing time and capital, in that city, encouraging the erection of homes by artisans for their own families; and other philanthropic men are following his example, so that up to the present time, by the means which they have furnished, about eight hundred houses have been built by workingmen for their own use. The removal of that number of families from competition for existing cottages and tenement houses, gives to the laboring class better opportunities to find homes without overcrowding, and supplies them with a higher standard of comfort. Mr. Wasson does not give to the purchasers of his lots anything beyond the opportunity to become their own landlords; but in so doing, he is in the best sense their benefactor, as they are not weighed down by a sense of obligation without an equivalent.

An allotment of land is sold for $400 on time, without any payment on account, a title to the property being given as soon as the proposed building is roofed in. Should the purchasers lose their employment for a term, they are not pressed for their installments, but, in the main, the payments are promptly made; and the class thus assisted are leavening the whole mass of the citizens of Detroit. The small property owner is a very great improvement upon the thriftless workman, who spends every cent of his earnings, when employed, because savings banks cannot be relied upon, and in the first wave of adversity becomes an insolvent debtor, or is carried away to increase the perilous army of tramps. In that aspect of the case, Mr. Wasson and others having the same objects in view, are engaged in a patriotic undertaking, whose value can hardly be overestimated, and a wise appreciation of such efforts becomes a duty from all who are interested in social science. Government in France considers such movements worthy of financial aid; and when the value of a proprietary populace is fully understood — how largely such a condition contributes to the peace, stability and healthful progress of society — men of wealth and governments will give more attention to the practical bearings of this subject.

Muhlhausen, in Alsace, is a workman's town; and is likely to become more so every year. During the year 1853, building societies were formed there, which in eleven years built 1,088 houses, each house having a garden 36x30 feet, and these residences became the property of the occupant workmen upon payments of $1.15 per week, for a term of fourteen years.

Upon certain conditions, the government of France voted $2,000,000 to be loaned to such building societies, and the step in advance proved to be most beneficial. The government insisted as the price for its help in the undertaking, that the properties should be sold to workmen at cost; that the properties so acquired should be inalienable for ten years; that the interest charged on capital should not exceed four per cent., and that in the center of the town there should be a public building, the cost of which should be spread *pro rata* on the whole undertaking; uniting under one roof, a reading room, restaurant, bath rooms, wash house, and a store or bazar for the sale of articles commonly consumed, at wholesale prices, to workmen. One society alone, in Muhlhausen, the Industrial Building Society, working upon its own capital of $25,000 and a loan of $80,000 from the government, located no less than 700 families in their own houses, under conditions most favorable to life and character; and a similar work has been successfully carried on in other towns in France and in England, with consequences that merit high praise.

Paternal governments and their operations are occasionally open to severe strictures; but that experiment at Muhlhausen with the results specified will offset many disadvantages, when in the near future the health rate and longevity of the workman town comes to be contrasted with the deplorable conditions of life in death which obtain in some parts of free America. In New York city three-fourths of all the sickness and mortality are found among dwellers in tenement houses; some of which are of the worst kind and worse crowded than any other such houses on earth. Let it always be borne in mind that 11 in 1,000 is the death rate in the Swansea A division; and that 15.09 in 1,000 is the average of death rate in Glendale; and we then see so much more clearly the enormous waste of life in the crowded tenement houses in New York, where the mortality reaches the dreadful average of 55 per thousand. There is no other city in the civilized world in which overcrowding is carried to such excess as in New York. The four most crowded districts in London show an average of 265 persons to the acre, the highest number compatible with health being 100 persons to the acre; but New York shows in its worst tenement house quarter no less than 300 persons to the acre, and there are some parts of Boston but little better. Mortality is severely dependent upon the space allowed to each human being. Given 202 square yards to each person and the mortality is one in 49; reduce the allowance to 101 square yards each and you increase mortality to one in 41; carry the reduction further, and at 32 square yards you reach a mortality of one in 36; which can be progressively increased until the horror of the Black Hole at Calcutta is eclipsed.

Epidemic diseases, such as the plague and the cholera, find fields ready for their operation where people are most crowded, and many of the most destructive diseases are greatly assisted by, if they do not owe their existence to human exhalations. The incidence of pressure on the several classes may be illustrated by the deaths from cholera in London in 1849, among the higher, the middle and the lower ranks of the population. Among the higher ranks death reaped only 26 per 1,000; in the middle class, 157; and among laborers and their families, 817 per 1,000. Of course these terrible differences are not entirely due to overcrowding in poor homes; poverty and neglect exaggerate the consequences of deficient ventilation; but the provision of cleanly, well ventilated homes would directly stimulate better habits into activity, and, in an appreciable degree, diminish want and neglect from other causes. In every country the people will be, in the main, just what their homes make them. Some few have enough initial force to make their homes; but in the mass, the homes make the people; hence it is of the highest importance that all practicable means should be employed to raise the standard of life. Savings banks guaranteed by the government, building and investment societies, under adequate control and supervision, and, in fact, any and all means that point toward provident and self-respecting habits in the community, are bulwarks for the nation.

The importance of home cannot be overestimated. It outranks schools and every other form of educational influence in building character; and we need not look for æsthetic excellence in the midst of physical degredation. Cerebral life predominates in towns, and animal life in the country. It is a significant fact, that nearly all our great writers have been educated in the city. So far as can be ascertained, Shakespere wrote nothing before he went to London, nor in the five years preceding his death, at the age of 53, after his final return to Stratford on Avon. In cities, men are radical and feverish; in the country, they are calm and conservative; and the blending of the two extremes by uniting home life in the suburbs to urban industries, through the agency of cheap railroad transit, and the operations of building societies, would bring new and better elements, which could not fail to prove beneficial, into our social problem. Homes in the country owned by workmen would largely economize life and health, would add to industrial results and mental activity, and, were it not foreign to our subject, it would be easy to show that the chasm so often fruitlessly deplored between labor and capital would have no dangerous existence in a community where every man rejoiced in his own roof and his own garden. Such ends are worthy the best efforts of philanthropists and legislators. Society, as defined by the nation, is a body organized for joint defense, not only as against other nations, but against all dangers, including want, disease and death, whether on the battle field or from wastefulness, criminality or vice.

Taking this view of our common obligations, it would be a laudable work to afford the guarantee of society to well founded schemes for improving homes, which would give better health, greater longevity and higher character to the people, as well as increased possessions available for all national purposes. That would be a war of conquest from which the nation and the world would come forth a gainer. The individual in this country has so much liberty in matters relating to health, that his freedom degenerates into license, to the great danger of the community. A benevolent despot, wise, well-informed and resolute to protect society from suicidal conduct, and worse than suicidal neglect, would legislate against tenement houses in disrepair and overcrowded, and against all haunts of disease, as determinedly as against any form of gross crime. We ought not to be content with less than the country average of life in health in cities. New York state loses only 38 per cent. of its life under five years of age; but New York city twelve more on every hundred. Rhode Island altogether shows an average longevity of over 31 years; but Providence, the most populous city in that state, can only attain an average of 27 years, although it is largely recruited from the country. Providence has the same average longevity with Liverpool, England; but the greater vitality of the English country districts appears in the average longevity of 38 years, which they attain.

The picked men in country districts, abounding in enterprise, gravitate toward city life, and are absorbed therein to an extent which figures cannot adequately describe; but, notwithstanding that circumstance, there are only seventeen men in every hundred, in the four largest cities in England, who live to be forty-five years of age, while in the country generally there are over twenty in every hundred attain that age. Out of 100,000 persons in Liverpool, only ninety live to seventy years; but in the rural districts, 202 live beyond that age. The eastern districts of London have an average of life of from twenty-five to thirty years; and the rural districts attain from forty to fifty years. General Walker says that the average life in the United States in 1870 was 39½ years; but New York city and Philadelphia ranged two years below Liverpool, or only twenty-five years, losing more than one-third of the general average duration. The military experiences of Prussia show that only 19.73 per cent. of town-bred men are fit for service, but the country districts supply an average of 26.58. In France, city life attains an average of thirty-five years; in the country, fifty-five years.

Ventilation and cleanliness are important factors of health in all homes however situated; but the requirements of any system of ventilation that is to be popularly applied must be simple and inexpensive, or it will fail in general utility. In the House of Parliament, in London, a complete staff of skilled engineers and employees is required to attend to heating and ventilating the building, under the very highest scientific direction; and in the capitol at Washington, with costly machinery, the worst possible results are attained, for want of skilled management. The simplest contrivance and the most effective for ventilating purposes on a large scale in this country, may be seen in the churches of Dr. Scudder, in Brooklyn, and of Dr. Hepworth, in New York. Flues lined with iron and supplied with gas jets, to create within them a current of warm air, carry off the foul air from all parts of each building, so rapidly, that the whole supply can be changed within five minutes; and the flues being under control, independently of the heating apparatus, enables those in charge to ventilate the buildings as efficiently in summer as in winter, because the ventilating flues can be worked to their full capacity without heat from the furnaces. This is the point on which the ventilation in many of our large buildings fails; because its efficiency is made to depend upon heat from the furnaces, and when spring opens and little fire is needed for heating purposes, the ventilation decreases with the amount of heat.

All ventilating shafts and flues should be so constructed that they can be efficiently worked every day in the year. Homes for the people need not have costly apparatus; ventilating ducts can be built around the chimney, one for each living room and sleeping room and these ducts heated by the fire needed for cooking purposes, would serve all ordinary requirements. Constructed with a small iron door at the bottom of each duct, or with a register on hinges, so that when little heat is furnished, during the spring or summer, an oil lamp could be placed in the base of any duct required to be active. So lately has the necessity of ventilation of dwellings been recognized for the maintenance of health, that experiment has not yet matured plans which meet every demand. The state should offer a premium, sufficiently large to enlist the best talents for the most perfect plans and specifications for a cottage perfectly drained and with simple and effective means for ventilation in every room. The ablest minds in this country and in Europe are at work solving the problems which the demand for better physical conditions in the homes of the people present, and no more worthy subject than this can be presented for aid to our state governments.

OUR PUBLIC SCHOOLS

IN THEIR RELATIONS TO THE HEALTH OF PUPILS.

By J. T. REEVE, M. D., of Appleton.

To educate her children is recognized by the state of Wisconsin as one of her primal duties. Engrafted into her constitution is a mandatory provision for the establishment of free public schools of uniform character. Ample legislation has given life to this wise provision, and as a result we enjoy the benefits of an educational system that, as our citizens take pride in believing, ranks among the foremost in the nation.

But though 300,000 of the children of the state avail themselves of the ample school facilities which have been provided, and though sixty-seven per cent of the entire population of school age is in school, this has not been deemed sufficient. Public sentiment holds firmly to a conviction that ignorance is subversive of free government and promotive of crime, and that sentiment has been crystalized into a law which makes attendance at school compulsory. In all this we see not the bestowal of a charity, but a far-reaching public policy, adopted to the end that there may be trained up men and women who shall be intelligent to understand, and efficient to rule the affairs of the commonwealth.

The state then having assumed this guardianship of her children for reasons looking to her own self-preservation, it is fitting to inquire what is involved in the relationship she thus enforces, and how well and wisely she performs her self imposed duties. To *secure* intelligence is not *all* that is needed. "It is a deep, broad *and high concern* of society," says Dr. Hunt, "whether the boys and girls who crowd to the school house door, and are seated in the school room for a period reaching over ten or twelve years, are there to find those aids to physical health to which they are entitled by nature, and which involve so much as to the effectiveness of their future citizenship."

During the years in which this relationship exists, under the laws of our state, the physical system of the child is undergoing its greatest changes, is making its most rapid growth, and is most susceptible to the influence of external surroundings. It is during this period, moreover, that hereditary tendencies may be with most certainty eradicated or developed, and when very often the foundations of all future good or ill health are laid. The physical organization, then, demands at this time special care and watchfulness, for, if it be not now properly developed, the chances are very great that it never will be, and that permanent invalidism will follow. Simultaneously with this physical development the intellectual nature of the child is also developing, and it is of the utmost importance both to the individual and the state, that this development be symmetrical and harmonious, and that both physical and mental shall be so wisely dealt with as to lead into healthful and vigorous maturity. It is feared that these facts are not infrequently forgotten, and that the mental faculties are too exclusively cultivated to the irreparable injury of the child, and it here becomes the province of the sanitarian to call attention to this wrongful treatment of the composite nature of childhood, and to declare that useful citizenship demands that education be not secured at the expense of physical development. Except in rare cases it need not do so; but if during childhood a high degree of scholastic attainment cannot be reached without imperiling the physical welfare, the interests of both state and individual demand that the former give way before the imperious necessities of the latter, for uneducated health can win bread, where education without health is powerless.

In view of these facts, it would seem that the physiological laws that govern the growth and action of the human system should be thoroughly comprehended, especially by teachers and school officers, and that the study of physiology and hygiene should form an essential part of the course pursued in all our public schools; yet as the result of an investigation, made by direction of the State Board of Health, into the extent to which these studies actually are pursued in those institutions, we find that very seldom is any place systematically provided for either in the school curriculum, and that in 5,197 out of a total of 5,361 school districts in the state (exclusive of independent cities), no text books upon these subjects are in use. The inquiry further reveals the fact that no knowledge of these branches or of the structure of the human body is required as a necessary antecedent to enable a teacher to obtain the third grade certificate, which is held by seven-eighths of all the instructors in the public schools of Wisconsin.

That this ignoring of a study which is certainly among the most useful of all studies, is not in accordance with the dictates of wisdom and prudence, will, we think, be evident to one who attentively examines the sanitary condition of our public schools, and those who attend them. Ample proof of this position is to be found in the full and intelligent responses to a circular of inquiry, which have laid before us facts concerning a large number of Wisconsin schools, in their relation to the health of students, some of which we purpose to present in this paper. The reports upon which the statements herein made are based, coming as they do from nearly every county in the state, are believed to embody faithful portraitures of all, and to furnish the best evidence of the fact that the physical requirements of student life are too generally ignored, and of the need which exists for bringing the hygiene of school life into greater prominence in every grade of public teaching.

From a careful study of these reports, it is manifest that whatever of mental discipline is obtained in our public schools, and that this is much and great, we have no disposition to deny or doubt, is obtained under circumstances and discipline which *needlessly* imperil the physical health and at the risk of impairing that balance of the physical and intellectual faculties on which alone an efficient manhood or womanhood can be upreared. Only through ignorance of the physical requirements of child life and of the now well established doctrines of sanitary science, can public school officers and teachers permit so many grave mistakes to enter into their dealings with children, during the period when the state, having assumed the duty of their education, should see that its own wise purposes are not defeated in the process, and its very life-blood enfeebled by the physical degeneracy of the rising generation.

SCHOOL AGE.

At the outset of an inquiry into the conditions under which an education is secured in the school house, and under the school laws of the state, we are met by the fact that a great physiological law is violated by the admission of children into the public schools at an age when the chief concern should be, not the mental discipline of the school room, but the physical development of the child. That provision of the state constitution which, without reservation or qualification of any kind, admits pupils into the public schools at the age of four years, must therefore be regarded as an unwise one.*

No statistics are available to show how many children of this minimum age are in our public schools, but that the number is very large none will probably question, and that a considerable number are admitted even younger than this, appears from the official records. Nearly six hundred were thus reported last year as "under four years of age." From the only data, at hand it is believed that more than one-sixth of the whole number of children in our public schools have not yet reached their seventh year.

SCHOOL ROOM STUNTING

is the expressive title of a paper read before the American Public Health Association,† and there is room for more than question, whether the early confinement of children in school rooms and to school tasks, is not stunting their growth and strength, both mental and physical.

Dr. Newell well says. that " however good the sanitary condition of a school, however well it may be lighted, warmed and ventilated, the usual period of confinement for young, growing, elastic children is in direct violation of the teachings of nature and of physiological laws." In the present method of conducting our public schools, comparatively little allowance is, or can be, made for the age of the pupils; the youngest, in many cases, are compelled to spend nearly as many hours in the school-room as the eldest, if not in actual study, in constrained, and to them unnatural and unhealthful, quietude. In the country or ungraded schools, where pupils of all ages occupy the same apartment, there must, for the sake of discipline, be maintained a semblance at least of attention, and a stillness more painful for the child to endure than prolonged labor can be to those of maturer growth. In the graded schools another danger exists; from every quarter comes the cry of over-crowded primary departments, for the relief of which the temptation becomes irresistible to urge pupils on as rapidly as is at all possible to such degree of advancement as will permit their passage to higher grades. In neither class is there, or can there be, without a radical change in the management of our public schools, "that adjustment of work and play, that variety in position," demanded by the physical nature of young children for the rightful development of body and of mind.

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* This minimum age is also legalized in the states of Connecticut, Maine, New Hampshire and Oregon, and in the territories of Montana, Utah and Washington. In all other state and territories, the minimum school age is either five or six years.

† By Dr. A. N. Bell, editor of the Sanitarian, a journal that has done good service in the cause of School Hygiene.

Neither teachers or school officers are wholly to blame in this matter. The law prescribes the age at which children shall be admitted to the schools, and an unwise public sentiment in too many cases demands the utmost that the law permits. There is great need of a revolution in this public sentiment, lest these plants of tenderest growth be crushed by the very weight of misguided care bestowed upon them during the period when the chief energies of the system should be given to the laying up of a reserve fund of strength, which may be drawn upon in after years.

The popular belief that there is any real gain in intellectual development by such early application, is not sustained by facts. We were recently strongly impressed by the forcible way in which a physician, whom in former years we had known as an observing and successful teacher, testified that children who entered school at eight, without any previous mental discipline, were speedily *found to equal,* and in many cases outstrip, in intellectual attainments those who had entered at the age of four or five. And an examination of the opinions of those whose opinions are of greatest worth, will show substantial agreement with this testimony. We should be glad to quote the evidence of many on this point, but, having space for only a small part of all in our possession, prefer giving some of that which has been communicated to us in personal correspondence, by some of the most eminent and observing teachers in the state.

Says Hon. W. H. Chandler, of Sun Prairie: "In my judgment, six years is the minimum age at which a child can profitably begin the course of study usually prescribed for the lowest grade of pupils in our Wisconsin schools. A child beginning that course at four years has no practical advantage over and is no further advanced at the age of ten or twelve than one beginning his school life two or three years later.

"I am most thoroughly convinced that by the exposure of children too young to exercise any discretion, in sending them to school, by the criminal and barbarous methods, or rather defiance of common sense in arrangements for heating and ventilation, for water supply and for obedience to the calls of nature, their health, physical and moral, is to an alarming extent, and to a disastrous degree, affected. And for this, the ignorance of teachers of the laws of health, of the nature and causes of disease, or their thoughtless neglect in using what they do know, is largely responsible."

Prof. Robt. Graham, of Oshkosh, writes:

"From six to eight years is the earliest age at which scholars should be admitted to our public schools. My observation leads me to the conclusion that to begin at an earlier age is detrimental to the best mental development as well as physical."

Prof. Samuel Shaw, of Madison, says:

"Taking the schools as now handled, from six to eight years old is young enough for children to enter them. I do not think that the child entered at four has any advantage over the one coming from six to eight, if both remain in school until from twelve to fourteen."

From a communication from Prof. I. N. Stewart, of Berlin, we make the following extracts: " It is my firm opinion that children should not enter school before they are six years old, even with our present course of study, which is brought to as low a standard as possible. I believe that good healthy children, entering school at six or seven, will outstrip those entering younger; they certainly will if not held back by the slow movements of those whose natural vivacity has been dulled by two years of useless drill and confinement. The fact is that a child recovers very slowly, if at all, from the apathy acquired in those earlier years in striving to learn something beyond his powers; he has been deprived of his natural playtime and feels that school and study alike are impositions — a feeling which it takes years to overcome.

Prof. C. W. Roby, of La Crosse, in a personal letter, reiterates his opinion published in the annual report of the Department of Public Instruction of that city for the year 1877: " After much observation, I am fully persuaded that, unless a system of Kindergarten instruction can be maintained, all children under six years of age might be profitably excluded from the public schools. Experience shows that the child who enters school at six is generally as far advanced at ten as the one who enters at an earlier age."

Many other experienced teachers and school superintendents have written to us in equally emphatic terms, but space forbids further quotations.

The question of what shall be done with these little ones of from four to seven years of age is not one for discussion in this paper. If it be admitted that the public schools, *as at present conducted*, where class system and discipline can make little allowance for age and feebleness, is not adapted to their needs, it is possible that such changes may be introduced into them, or such special provision made, as will meet the admitted need; this may be done at least in the larger villages and cities, while in the country the question will, to a great extent, take care of itself. The more general and systematic introduction of a proper system of light gymnastics and physical exercise would be a movement in the right direction, and wherever practicable, some such system should be adopted in all schools where young children are congregated. What *we* plead for is a better recognition of child nature, and such modification of existing conditions as will make school life consistent with the physiological demands of the child. If the little ones must be sent to school, they should have the wisest and best of teachers, and oral instruction and object lessons should have a larger place in their courses of instruction. As a long step toward this order of things, we welcome the prospect that Kindergartens may be established in connection with our institutions for the training of teachers — the state normal schools.*

With all the testimony that has been offered there is left no room for reasonable doubt, that if seven years were the minimum school age,† if intermissions were more frequent and physical education more common and systematic, the child of eleven or twelve years would equal in intellectual attainment him who entered school at four, while the improvement in physical health would be so decided, and the zest for study so greatly increased, that the succeeding years of school-life would show yet more strongly marked advancement.

But danger lies not wholly in the premature admission of children to school. In the hot haste to secure early results, the immature brain of childhood is frequently subjected all through the school course to a strain which exceeds its powers of endurance.

Dr. Whiting, in the president's address, delivered before the Wisconsin State Medical Society in 1876, says: "In the laudable ambition as to which school shall stand highest on the record in class-work and general scholarship, the fact that there is a limit to the mental and physical endurance of children seems to be lost sight of. Pupils are pushed forward in their work till it is utterly impossible for the average capacity to endure the stress, and many of them become depressed and disheartened and fall out of their classes. * * * * * The truth is, we are trying to do too many things in our schools, and our children are pushed onward into higher branches of study before their natural intellectual development warrants it. If you doubt this, I ask you to visit some school of the intermediate grade, where boys and girls of ten and twelve years old are taught, and, if the recitation chances to be in arithmetic, if you do not find these boys and girls struggling with the analysis of problems that will baffle three out of five of you, your experience will differ from mine. If the lesson be in geography, then I think you will be amazed not that some fail, but that so many have memorized the text of the author, and are able to pronounce the stilted, and *to them* meaningless words often employed in discription."

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*Vide Journal of Education for September, 1879.

†The State Medical Society of Rhode Island in 1874, unanimously adopted resolutions on the subject of School Hygiene, which embrace the following: That physical culture should be made a part of our school system; that the Kindergarten system should be engrafted in to our public schools; that no child under 7 years old should be admitted into our schools as now conducted; that under 12 years of age, three hours per day, and over that age four hours, is sufficiently long for confinement to mental culture. (HUTCHINS.)

"The New York Medico-Legal Society, which is composed of the best talent of the professions of law and medicine, and organized for the purpose of instructing the public upon hygienic subjects and correcting hygienic abuses, fixes the time of beginning school at 8 years, and would make the maximum length of attendance three hours daily for primary pupils."

(Dr. J. C. REEVE.)

As applied to a very considerable proportion of our public schools, this is by no means an overdrawn statement. The power of fixing attention or of concentrating thought is, with children, limited; we commend to teachers an examination of the opinions of careful and competent observers as to what its limits may be, but without here attempting to define them, we may safely assert that their utmost bounds are daily transgressed in many schools, and that tasks are required which are wholly disproportionate to the age or capacities of the pupils. Proofs of this statement may be drawn in abundance from the testimony of observing physicians, and from the too-often unnoticed but convincing evidence given by the irritable temper, the disturbed sleep, the frequent headache, and the fitful appetite, which betoken the broken health of pupils, partially and temporarily remedied by frequent and sometimes prolonged withdrawal from school.

We are aware that some teachers claim that it is only in exceedingly rare cases that children are injured by the amount of study required from them, and that they are frequently under better sanitary conditions in the school room than they can be out of it. In so far as this latter claim is true, it is the normal condition of things. It should be true of all schools, for a due amount of study is as essential to a harmonious and efficient development as a due *amount* of play and labor; but there are very many schools of which it is not true, and in very many schools, throughout the whole period of student life; the methods and hours of study need, more than they receive, careful adjustment to the varying capacity of the pupil. Recreation and exercise should be regarded neither as wasted time, nor yet as "mere relief from mental toil," but as necessary ministers to intellectual culture. "Recreation is, *or ought to be*," says Mr. Romanes,* "not a pastime entered into for the sake of the pleasure which it affords, but an act of duty undertaken for the sake of the subsequent power which it generates, and the subsequent profit which it insures."

These are words of sound wisdom, which every worker in the busy hive of life may well heed; they are of special value to those who have the care of the mental culture of youth. We commend them to the consideration of every teacher in the land, for teachers need to know, for themselves and for their pupils, the limits beyond which it is not possible for mental labor to be carried with profit. "School work is brain work," and that of an exhausting kind, and an exhausted brain can no more work efficiently than can an exhausted body. "A broken leg," says Dr. Beard, "one can see and touch and handle, but an exhausted brain, oftentimes a far more serious matter, is passed by, and even its existence is doubted."

It is not inappropriate here to ask the question, if in some public schools a mistake is not being made as to the *proper* end and aim of a *common school education.* "The public school, in all its departments," says Prof. Newell, "must be regarded as the turnpike road from which the travelers may step at once into the farm and workshop." Are we not rather regarding it as "the vestibule merely, to the high school, which in its turn is the ante-chamber to the college?" Edward Everett, in speaking of education, said:

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* Popular Science Monthly. Since this paper was written we find in the Sanitary Record of London, an able article on School Sanitation, by Edwin Chadwick, C. B., in which he claims credit for the introduction of the half-time school principle and the introduction of physical exercises in the time thus saved from sedentary desk work, of which he says, that "the general result of the combined mental and bodily training on the half-school time principle, is to give to two of such children the efficiency of three for productive occupations." These words may possibly be regarded as those of an enthusiast and as inapplicable to our American schools, but they add force, nevertheless, to what has been said above.

"To read the English language well, to write with despatch a neat, legible hand, to be master of the first four rules of arithmetic, so as to dispose with accuracy and at once of every question of figures which comes up in practice,— I call this a good education. And if you add the ability to write pure grammatical English, I regard it as an excellent education. These are the tools; you can do much with them, but you are helpless without them. They are the foundation,and unless you begin with these,not with flashy attainments, a little geology and other ologies and osophies are ostentatious rubbish." It is because the school has departed from this ideal, and is prematurely reaching after the higher branches of education before time has been given for the thorough mastery of the lower, and before the brain of the child is competent to thoroughly understand them, that the charge of overwork and mental strain becomes a valid one.

NUMBER OF STUDIES, AND TIME REQUIRED FOR THEM.

We have already spoken of the limits of a child's capacity for brain work. Whatever estimate may be put upon it, it is manifest that it must be far below that of the mature man; yet the number of separate studies given to young children in many schools, and the brain labor required to grasp them, are greater than can wisely be meted out to those much more mature in years.

Abundant confirmation of the statement just made is found in the reports lying before us. Turning to them for answers to the question concerning the proportion of pupils who are required to study out of school hours, the time required by the average pupil for the preparation of the work demanded, and the largest number of studies pursued by any one pupil, and while there are many who report, in substance, that not more than three or four studies, with one or two general exercises in addition, are permitted, and that advanced students only are required to study out of school, and they generally not more than one or two hours, it is nevertheless true that there are a very much larger number who report a number of studies, and an amount of labor required to master them, which must be considered as beyond the successful grasp of *any except those of* brightest capacity.

Thus, in examining the reports with reference to the time required by the average student to prepare the daily work, we have the following replies, selected as representative of a very large number: "For preparation of average work from three to ten hours is required, and one fifth of the students need to study out of school hours." "All study out of school hours; average student needs from six to eight hours to prepare the required work." "About one-half are obliged to study out of school hours; an average student needs from six to seven hours to prepare work." "Proper preparation of work will require the time during school hours, (six hours with two intermissions of fifteen minutes each), with a small proportion of outside time, probably *not exceeding four or five hours*." "Five or six hours of *solid work* will prepare the amount of work required." "Two-thirds of the pupils study out of school." This last answer being given in many instances.

Quotations might be greatly multiplied, but the above will suffice for illustration. A few have considered it necessary to explain or apologize for the excessive number of studies or the excessive amount of work required, in such ways as the following: "The number of studies is too great, but the teacher is compelled to conform to the wishes and prejudices of parents and pupils." "Few are obliged to study out of school, but the majority do so in deference to the wishes of parents."*

Taking up next a large number of reports, selected with a view to securing a fair representation from several parts of the state, and including both city and country schools, and examining them with reference to the number of studies pursued, we obtain the following statement:

Largest number of studies pursued by any one pupil..	2	3	4	5	6	7	8	9	10	12
Number of schools reporting the above numbers of studies........................	1	7	45	130	173	92	49	16	8	2

From which it will be seen, that out of five hundred and twenty-three reports examined with reference to this one question, in one hundred and sixty-seven, or very nearly one-third of the whole number of schools embraced in the above table, some scholars are permitted, if not required, to undertake seven or more studies at the same time — probably not to recite in all upon the same day, though in no one instance is it so reported.

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*Parents are legally the ultimate judges as to what may be required from their children.

We find a general uniformity of result in several series of reports, aggregating one hundred and seventy-eight, which were examined at different times with the object of obtaining a fair representation of opinion upon the question whether the work done in the schools is productive of injury in any cases. Out of the above number one hundred and twenty-two declare that no more than six studies is permitted to any one pupil at the same time, and, of this latter number, thirty-seven, or *thirty per cent.*, admit that some students are injured by excessive study and the necessary close confinement to the school-room — while of the remaining fifty-six, who permit or require from seven to twelve studies at once, seven only, or *twelve and one-half per cent.*, are found who will admit such danger, the ratio diminishing as the number of studies increases. Comment upon such statements is needless; they carry their own lesson of criticism upon the judgment of those who thus report.

It is not known to the writer whether composition or declamation are generally included in these studies or not. In the only cases where they are specifically referred to in the reports, they are not included; but it should be remembered that however simple the compositions of childhood may appear to adults, they are often the product of exhausting brain labor. In very few cases is it known, either, how many of the "studies" are classed by some teachers as "general exercises," requiring no concentration of thought except during the time the exercise is being conducted. In many reports, in which the lower numbers of studies are given, it is added that there are one, two or three "general exercises in addition," and it is to be presumed that these are included in those which mention the higher numbers. Making, however, the most liberal allowance for all such cases, the fact remains, that so great a variety of study can have but one out of two effects; that they either overtax the brain or produce a mental dissipation; an attempt *to pursue* too many studies, resulting in the thorough comprehension of none, and in losing, to a great extent, the benefit of all, ending, if continued too long, in an enfeebled and illy balanced intellect. Dr. B. W. Richardson says: "I believe it will be found, without exception, that men with one idea have been over-pressed children, who, finding it impossible to take in all that was tried to be driven into them, contented themselves at last with one object, and were lost to everything else."

Dr. Kempster, in a recent address on mental hygiene, says: "The discursive method employed of introducing a half-dozen subjects at once to the opening intellect of a growing child, is injurious because he cannot grasp them. * * * I give it as my opinion that immense harm is coming upon the brains of the children of this land by the hot-bed system of forcing education."

In an address delivered before the State Teachers' Association some five years ago, Dr. J. Hobbins, after entering a plea for shorter school hours, in which he proposed to divide all the pupils in the public schools into two classes, the one to contain those under twelve years, the other those over that age, allowing not more than four hours *per diem* in school to the latter class, and three hours to the former, advised that the number of lessons and exercises be diminished because the tension of mind and the intellectual excitement needed to accomplish so large an amount of work are incompatible with health.

Dr. J. C. Reeve, formerly of this state, now of Dayton, Ohio, in a lecture on the Brain and Nervous System, after asserting that physiology teaches that children should not begin their school life at an earlier age than eight years, and declaring his belief that confinement in the school room for six hours per day is too much for any child under twelve years old, proceeds: "Ask young men at college; ask professional men how much six hours' good, mental labor lacks of being a full day's work, and with all the extenuations that can be urged, I think that you will find that schools approach pretty nearly to requiring of children below twelve the work of full grown men."

Such warnings as these should be heeded; they are the deliberate judgments of men entitled to the highest confidence; yet through ignorance of the capacity of endurance in the intellect of childhood there are very many cases in which, when a child fails to perform the set task in the required time through sheer inability to do so, there is meted out punishment in a form for which there can very seldom be any apology; we refer to the common custom of detaining the pupil in the school room and at work during recess, or after school hours. Such punishment is in direct opposition to all principles of school sanitation. Mr. Romanes says: "To shut up a child already weary with work in an empty school room under a depressing sense of disgrace, is something worse than cruel: to the child it is a wrongful injury that does not admit of being justified by any argument, and in running counter to all principles of physiology and education, it is a sin against society."

Such detention, moreover, is often resorted to, to the great injury of pupils, not as a punishment, but in the haste to push children from a lower to a higher grade. Instances of this kind have been reported to us where children from seven to ten years old have been detained on an average more than two hours daily for weeks in succession. In such cases there is, of course, in combination with the evil of prolonged hours in the school room, those of artificial stimulus to study and this leads us to the brief consideration of

ANOTHER EVIL,

which, it is feared, is of growing tendency in nearly all departments of our schools, *i. e.*, the extent to which the system of honors, prizes and markings, the last-named most especially, has been carried in the effort to lift the supposed dull students to the level of those of the brightest capacity. In this, all healthful limits of individual ability have frequently been exceeded; the stimulus excites those who need repression, and fails to affect those who are supposed to need its influence. For such unwise stimulation we believe teachers to be almost wholly responsible, and we believe also that the study of physiology, and a better knowledge of the mental hygiene of childhood, would be the best correctives.

EXTERNAL HEALTH CONDITIONS.

States and communities having a more vital interest in the physical perfection than they can have in the mental culture of their children and youth, we have the right to expect that, in the home which public authority provides as the place in which they are to be congregated through the most important years of life, we shall find the health conditions to be all that the most painstaking care can make them. Knowing that mind and body are interdependent parts of one organism we have the further right to expect in the place where the one is to be trained and disciplined, all that is essential to the right and best development of the other. A careful examination of the actual condition of the average schoolroom and its surrounding, will, however, rudely dissipate any such expectations; we shall find, indeed, that the sanitary conditions of very many school houses are such as merit the strongest reprobation. I do not at all suppose that Wisconsin school houses are exceptionally bad, but the practical question is one of actual condition, not of comparison.

We find many buildings which have been constructed at great cost, that present an attractive appearance, and that minister to both local and general pride; but a critical examination of them with reference to their adaptation to the uses for which they have been built, will show defects in a large and wholly unexpected proportion — defects of a character such as seriously to imperil the health of their inmates. Many are badly located, most of them are badly ventilated, and not a few are over-crowded; a very large proportion grievously injure the eye-sight of the children gathered in them, while uncomfortable seats, imperfect janitorship, lack of proper means of heating, filthy outbuildings, and a water supply sometimes unwholesome, sometimes distant, or otherwise inconvenient of access, often wholly wanting, are among the many disagreeable facts that meet us as we enter upon such an examination.

It is not the purpose of this paper to go into details on these points; yet they so aptly illustrate the need that exists for popular instruction in the laws of hygiene, that we cannot forbear to call attention to a few of the most prominent defects. It is perhaps impossible in all cases so to locate a dwelling house that it shall be free from proximity to all unhealthful or distracting surroundings; but it is very seldom impossible to secure a desirable and healthy site for a school building, in the location of which there may be a considerable degree of latitude. A reasonable spirit of compromise and above all a just conception of the importance of the matter should be sufficient to secure the choice of the most healthful and beautiful ground that the district has to offer. The convenience of sparsely settled localities can be no excuse for contentment with a site that is low and damp, or that is in the vicinity of unwholesome nuisances and yet schools are found in such situations with surprising and wholly needless frequency.

The popular feeling of many districts appears to be that which is well expressed by a teacher who says in her report: "People seem to think that a place which they would consider too poor for their own houses is good enough for a school." Neither is there any excuse for not having dry and pleasant play-grounds attached to every school house. On this point we quote to commend from the report of a teacher who says: "A school is much easier governed when the surroundings are neat and attractive, and the room clean and generally homelike and comfortable. I have often planted flowers around the school house, and have invariably found that the children took pride in caring for and cultivating them, and *were better scholars for so doing.* The school should be the most attractive and pleasant of places." There is unquestionably sound truth and hygienic education in this cultivation of the æsthetic; but whether it be practicable or not to render the school-house attractive, there can be no excuse whatever for unhealthfulness of construction. The building may be utterly plain as to exterior or interior, but it must not be the cause of disease to its occupants. In the school room, during the developing years of life, more hours are spent than in any other one place, save the room devoted to sleep. Into it are brought, from the many and various homes of its inmates, whatsoever habits of personal uncleanness, or whatsoever elements of contagion are developed in those homes. If we consider that to these there is often added the dangers arising *from close contact*, from over-crowding, from undrained and illy-ventilated rooms, in which the tainted exhalations from the breaths and bodies of the most uncleanly and the diseased must pass through the lungs of all, we may appreciate to some extent the "perils of the school-room," for which we can look for an adequate remedy save through the general diffusion of that sanitary knowledge which will secure needed reforms in school architecture.

In the good time coming, when such knowledge shall be sufficiently extensive, the people will no longer tolerate a condition of things which they now regard with indifference, but will demand in the school room that purity of air and abundance of air space, which is necessary for the proper maintenance of the most healthful physical life. In that good time, moreover, they will tolerate no such display of ignorance of the principles of ventilation as that manifested in rooms that exist in this state, where handsomely decorated registers lead into flues wholly closed at the top, or where a tube three inches square is provided for the ventilation of a room containing seventy-five pupils!

Another evil of startling magnitude in school life is found in

THE EXTENT TO WHICH EYESIGHT IS SUFFERING.

The growing prevalence of eye diseases among students has within the last ten years attracted much attention both in this country and abroad. The general conclusion reached, after careful examination of the eyes of more than twenty thousand children is, that imperfect light, and light which comes to the eye from trying positions, especially when combined with close application to study, prolonged and strained attention to near and minute objects, are the chief factors in producing these diseases. A lady of intelligence remarked in the presence of the writer not long since, that one-half of all the students in a certain school for advanced instruction which she had formerly attended, were suffering from some form of eye disease, and that many of them were compelled to modify their courses of study in consequence thereof; examination of the reports already referred to has been carried to the point of finding two hundred and fifty schools which report that the eyesight of some of the pupils engaged in them is suffering, this number being a little more than one-third of all of the reports examined on this point, while the same reports often contain a probable explanation of the causes in some combination of unsanitary conditions, notably in the blinding glare which falls upon the eyes of pupils while engaged in study, or yet more often, in blackboard exercises. Dr. Loring, an excellent authority in such matters, says: " My belief is, that the amount of school work consistent with a healthy condition of the eyes, has not only reached its farthest possible limit, but in many places far exceeds it." This is a subject which demands the careful attention of educators and school architects, and furnishes another excellent illustration of the existing necessity for the comprehension and practical application of hygienic laws on the part of all who have to do with school life.

EDUCATION SHOULD BE PRACTICAL.

In view of all that has been said, it may be asked if we hold that educational processes may be carried too far. We have made no such assertion, nor is loyalty to and the sincerest love for the common school, " the crowning glory of the age," inconsistent with calling attention to its defects. It is not to the aggregate of work sought to be done, or the fact that higher branches of knowledge are taught in our public schools, that these suggestions are directed. *If there be time* for the pursuit of all these studies, they are right and desirable; but it has appeared to the writer that such unwise attempts are being made to cram children of immature years with these higher branches of education, as cannot fail to to be productive of evil results; that the practice of some and the tendency of many schools is to demand from children of ten, twelve or fourteen years, as many if not more hours of mental work than it is prudent to allow to children or youth of any age. It is entirely true that the necessities of parents often terminate the pupilage of children at an earlier age than is consistent with the completion of the school curriculum, if not thus hurried through; but it is not true that education ceases with attendance at school. If the physical system be unimpaired, and the child has the acquirements described by Mr. Everett as constituting an excellent education, *if he has been taught to think* rather than to memorize, the school *has given him a* most excellent foundation, and has done all that it is needful to do for any one to enable him to reach any height to which ambition may lead. If, on the contrary, the foundations of physical and mental health have been impaired, all that comes afterward is imperilled.

The highest and best requirements of the whole system demands the equal and co-ordinate development of body and mind. School life may, and should be such as will secure this result, so that as maturity approaches, increasingly heavy burdens may be borne without injury; but the brain, which is the last organ to arrive at maturity, cannot, with impunity, be too hardly pushed while in a plastic state.

The education that a child obtains in school has two chief objects: 1st. The acquirement of knowledge. 2d. The acquirement of mental discipline by study, by which he is enabled to digest what is obtained elsewhere. Very much of the study and memorizing of lessons in the school-room is for the latter purpose, the things learned having in themselves so slight a bearing on anything that is practical either to the child or in future life, that they are speedily forgotten when once the school is left behind. There is coming to be a wide spread belief that there should be more of practical instruction in the education that is given to our children, and that some of the weary years that early childhood spends in the study of impractical things, may be better utilized.

The London Times, in speaking of the prominence given to mere memorizing, says that to teach children "something about gravitation, atmospheric pressure, the effects of temperature and other simple matters of like kind, which would admit of experimental illustration, and call upon the learner for statements in his own words instead of those of somebody else, would be so many steps toward real mental development." It is claimed for physiology and hygiene that they stand forth prominently among the practical things commended, and that, involving as they do, the study of other sciences, they may, while storing the mind with useful knowledge, be made a valuable means of mental discipline. It is on this ground that we urge that they be given a prominent place in the public school curriculum to the exclusion, if need be, of less useful studies. That there may be practical difficulty in doing this is fully appreciated, but the immense importance that attaches to rightful instruction in these matters, gives value to every intelligent effort in this direction. No real difficulty in making physiological studies interesting and attractive is inherent in the subject. If the teacher be thoroughly interested in them they may be made attractive even to the youngest pupils. It is of happy augury that simple practical treatises and familiar lectures upon these subjects, adapted to the comprehension and needs of school children, are being multiplied in this and other countries.

Says Herbert Spencer: "We assert that such a course of Physiology as is needful for the comprehension of its general truths and their bearings, is an essential part of a rational education. Strange that such an assertion should need making! Stranger still that it should need defending! Yet, men who would resent as an insult any imputation of ignorance respecting the fabled labors of a fabled demi-god, show not the slightest shame in confessing that they do not know where the eustachian tubes are, what is the normal rate of pulsation, or how the lungs are inflated. So terrible in our education does the ornamental override the useful, that while the great bulk of what is acquired has no bearing on industrial necessities, an immensity of information that has a direct bearing on them is passed over."

To incorporate these practical things into our public school teaching, is worth the most strenuous and persistent efforts. As preparatory thereto, careful examinations in Physiology and Hygiene should be required of all who seek certificates as teachers, and an important place in oral instruction, general exercises, and object lessons should be assigned to them, in schools even of the lowest grade. It is not enough in any grade, that the teaching of these branches be confined to routine question and answer, from which they are liable to degenerate into the merely dogmatic, in which it is almost impossible for a child to become intelligently interested. The teaching should be, must be, vitalized made personal, and of direct application to daily and hourly life.

TEACHERS SHOULD BE SANITARY STUDENTS.

"It is not expected that all teachers will be physicians," says the *editor of the Popular* Science Monthly, "but it is a part, and a most essential part, of their business to inform themselves with some thoroughness in regard to the mechanism, normal workings, laws of endurance and morbid indications of the nervous system. They should read so widely and carefully upon this subject as to induce caution, and not to become the heedless instruments of an inexorable policy that takes no account of physiological circumstances, hereditary defects, abnormal temperaments, constitutional dullness or precocity, and various other conditions which ought often to qualify school-room management." Neither do we urge or expect that teachers shall become expert sanitarians, but we do urge that they be *students of sanitary science*, and that they seek to exemplify its teachings in every school over which they may be placed.

OUR SCHOOL ARCHITECTURE,

moreover, sadly needs remodelling; and here also the teacher can render good and effective service. Let him persistently impress the importance of this matter upon school officers, and upon the fathers and mothers of the children placed in his care, and the old buildings, which in time must be abandoned, will be replaced by those which will show that the lessons have not been unheeded.

It would be well if plans for school buildings, drawn with special reference to the health requirements of those who are to occupy them, approved by competent authority, and adapted to the needs and pecuniary abilities of differing localities, should be furnished by the state superintendent to all applicants without cost; and if the same authority which makes attendance on school compulsory should declare, under forfeiture of state funds, that no school building should hereafter be erected and occupied that did not, in all essential respects, conform thereto, another desirable step would be taken.*

Meanwhile, the teacher who knows that foul air in the school-room is as truly filth as though its "aerial nastiness" were visible, that the rebreathing of air that has once passed through the lungs, poisons the body and stupefies the brain; that an imperfectly lighted room or a blinding glare of light in the eyes produces disease of those organs; that improper arrangement of seats and desks brings not only immediate discomfort to the pupil, but leads to special permanent deformities, may, by his influence, his importunity and his own personal labor, bring many improvements into the old building, and do much toward making it more tolerable while it must last.

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* The Plumber and Sanitary Engineer has recently offered a prize of $500 for the four best designs for a model school-house in a sanitary aspect, and adapted to the needs of a large school. If a similar prize was offered for designs for a school-house adapted to the wants of country and village schools, it would doubtless develop some good results.

One of the most general and most dangerous defects of existing school buildings is that of imperfect ventilation; but, in the great majority of cases, some way may be found partially to remedy the evil without introducing cold blasts of air that "slay like a sword." There are certain kinds of stoves that do good service in ventilating rooms in which they are placed, being so constructed as to use up the foul air of the apartment in the process of combustion, and supply its place with pure, warmed air from without. A due appreciation of the importance of purity of air may make it possible to devise some way in which the old stove may be exchanged for one of these. If this be not practicable, some simple and inexpensive device for removing foul or introducing pure air may be applied.*

In short, if the teacher be thoroughly alive to the matter there are many ways of improving the old building, every one of which is an object lesson of direct educational value to the pupils who study in it. "Cleanliness, which is akin to Godliness," exhibited and commended in the school room and in all the surroundings of the school house, will in time find itself reflected in many another home. Not only cleanliness but cheerfulness and beauty have direct educational power in themselves. Let, then, the too frequent bareness and blankness of the school-room walls give way to inexpensive, if need be, but tasteful adornment. Mottoes, pictures, flowers within, trees and flowers and vines without, are not distracting but elevating in their influences, and in the work of providing and caring for them, the children will be willing, enthusiastic helpers — receiving the while wholesome physical culture and sound sanitary and æsthetic instruction, the harvest from which is to be gathered in later years.

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* Among these may be mentioned one, the credit of which is due to Mr. W. J. Langson, secretary to the chamber of commerce in the city of Milwaukee, in whose rooms it was first seen by the writer. It consists simply, in the introduction into the horizontal part of an ordinary stove pipe, of a "T" joint, the vertical arm of which is extended to within a few inches of the floor; this constitutes a foul air flue, and very materially assists in the purification of the atmosphere in the room. It should be furnished with a snugly fitting damper, which may be wholly or partially closed should there be any interference with the draught of the stove. This device is noticed and commended by Dr. Hewitt, secretary of the State Board of Health of Minnesota, in the fifth annual report of that board. Alone, *so far as its capacity permits*, it will do excellent service, but if, in addition, we employ some means of introducing, without draught, a supply of pure air, we shall have all the principles of a perfect ventilation. This can be done to a considerable extent by banking the house with clean earth, closing up as far as possible all crevices, and leading into the room an air trunk which shall deliver fresh air under the stove. A properly arranged metal jacket surrounding the stove will be a valuable addition. If this arrangement be impracticable, air may be introduced as often advised by raising one of the lower sashes a few inches and *placing a well-fitting* board in the opening thus formed, fresh air entering between the *sashes.*

THE TEACHER'S WORK.

If it be asked whether these changes, if made, would increase the teacher's work, we answer nay. Upon some they would have but little effect, for "if the teacher be incompetent, indifferent or unfaithful, no degree of perfection in school appointments or excellence in text-books or plans can redeem the school from substantial if not utter failure." *

Upon the great body of teachers, who we believe are imbued with the spirit of their calling and faithful to its demands, we would willingly lay not the slightest additional burden. The ceaseless round of work which already falls to their lot, robs them of many a hour that should be devoted to rest and sleep, and the frequency with which they falter and fall out of the ranks attests the severity of their present labor. Rather would we seek to make their profession so attractive that for very love of it those who enter its honored ranks might desire to remain there. We believe that with a better appreciation of physiological and hygienic laws, there would come such reforms in the methods of teaching and such care for the sanitary construction of school buildings as while in every way benefitting the scholars, would as truly benefit the teachers also ; would lighten rather than increase their burdens, and contribute to the permanence of the relation between them and their pupils.

* Stark.

Appreciating what teachers have done and are doing, we may adopt the language of Dr. Hutchings and say: "For what there is of excellence in educational processes, credit is to be given without stint or reservation to the educators; what is deficient, incomplete, injudicious or harmful is not so much to be passed to the account of the educators as to the thoughtlessness, lack of discrimination, unwise ambition and avoidance of responsibility on the part of parents. The teacher, by the very exercise of his vocation, has always been in advance of public sentiment, and, chafing under restraint, has never been permitted to act up to the full limit of his experience. No more earnest, patient, sacrificing, absorbed, enthusiastic and intelligent workers gather around any labor than those who wait on the ministry of teaching." *

THE ENCOURAGEMENT.

In what rests the hope that the things herein shadowed will find practical recognition in the school room? Clearly some of the changes suggested must come, if at all, through a popular appreciation of the relations of health to education, and through such public sentiment as will demand the modification of existing school conditions. The public school exists *for* the children of the state, and while the law sanctions their admission thereto at the age of four years, neither teacher nor school officer can deny them entrance, whatever their convictions. And in the great world of demand and supply teachers will ever be found to meet, in so far as is possible, the requirements of parents concerning hours and courses of study, whether wise or unwise. The problem then involves the instruction of both teachers and parents in the physiological needs and requirements of children; for this the sanitarian who sees its need, must sedulously labor.

But there is much to give us courage. In the great awakening in all that pertains to the laws of healthful living, which has pervaded the country for the last few years, Wisconsin has not been slumbering, and her teachers and people have shared in the progress. In the suggestions made to us by many teachers and county superintendents, we have pleasing evidence of this fact, and the frequency with which some phase of school hygiene is introduced into teachers' institutes, the avidity displayed by them for lectures on school sanitation, and the numerous discussions of the same subject in the Journal of Education, all testify to the same desirable state of things. Special mention should also be made of the State Superintendent, who has shown a warm interest in all that pertains to the health and health surroundings of the army of school children under his supervision, and who by his official influence has contributed in many ways to the awakening of public interest in school sanitation.

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* *Prize* Essay of the Med. Society, State of N. Y., 1875.

We may also look hopefully to the normal schools of the state from whence our supply of teachers is largely to be derived. Into these institutions are annually gathered nearly one thousand students, whose avowed purpose is to engage in the work of teaching; we may reasonably look for a greater degree of permanence in this work from them than from those who make the vocation only a stepping stone to other professions; hence it is with peculiar pleasure that we learn from the several presidents of these schools, in response to letters of inquiry addressed to them, that the studies of physiology and hygiene are given increasingly prominent places in them, and that the instruction given in some, if not in all, has special reference to future work to be done in the school room.

"The course of study indicated in our catalogue," says one of these gentlemen, "is only an outline and gives a very imperfect idea of our work; a constant effort is being made to impress students with general and specific right living as a personal question in their own domestic habits, in sleep, diet, ablution, physical exercise, study and recreation, by general regulation and by specific caution given to individual students." Such are precisely the lessons which we hope will be inculcated by these students in the schools which they are to hereafter govern, and from which we may confidently expect great and good results.

Through all these channels, and through the active co-operation of many who are welcome workers in the great field of school hygiene, we may hope for such extension of sanitary knowledge among the people as will secure careful investigation of all the environments of school life, and out of all we may confidently hope that the problems of health and education will receive such a solution as will bring with it a settled conviction that the highest attainments of one is not incompatible with the highest perfection of the other, but is rather dependent thereupon.

CONCLUSION.

It has not been forgotten in preparing this paper that there are very many unhygienic influences other than those of the school room, or of methods of study to which children are subjected during the years of school life — that there are homes where every principle of hygienic living is violated — that there are parents and guardians who ignorantly or purposely subject the health of their young charges to the risk of utter ruin, physical, mental and moral. We would by no means be guilty of charging upon school life what is justly chargeable to home life or street life, but we would enter a plea that the public school in so far as it can, may be made the instrument of bearing to these homes lessons in education, in health and in virtue — a three fold cord which shall *forever* bind the hearts of the people unto itself.

OUR SCHOOL HOUSES.

By Prof. T. W. CHITTENDEN, of Appleton.

In a paper written for the third annual report of the State Board of Health, we used the following language: "If the state should appoint a competent inspector to examine and report upon the sanitary condition of our schools and their surroundings, a state of things would be revealed disgraceful in the extreme to any civilized community." During the past year something has been done toward obtaining such a knowledge of the actual condition of our schools, and the information gathered is, we regret to say, of a character to justify fully the above quoted words.

We wrote them, and we write the account that follows, in no spirit of hostility to the public schools of Wisconsin, for we believe that one of the first duties of the state to her children is to insure to them a sound education. Long and careful observation has shown us, however, that such an education is often obtained at too great a cost; no fact is better established, than that body and mind act and re-act upon each other, and that if the body be permanently injured for the sake of developing the mind, the ultimate profit of the transaction is more than doubtful. "What can Hercules himself do in a race if he have only a rotten boat?"

We recognize fully the fact that to obtain an education the child must be subjected to a certain amount of restraint; that interference with what may be called natural conditions is, to a great extent, inevitable. For instance, the confinement to the same place for one, two, three or more hours each day, the demands made on sight, attention, etc., the enforced silence and quiet of the school-room, are all unnatural, but are all nevertheless necessary conditions to giving and receiving an education, and we do not look for the dispensing with any of them. What is demanded is that none of them shall be carried so far as to be permanently or even temporarily injurious. We have the right, too, to ask that the buildings in which our children are taught shall have nothing in themselves or their surroundings which shall tend to impair the health and vigor of their occupants; that they shall be so constructed as to admit pure air freely, while yet they shall be comfortably warmed; that light shall be sufficient in their various apartments, while the sight shall not suffer either from its excess or from its faulty distribution; that school sites shall be dry and elevated; that sufficient provision for all natural wants shall be made; in short, that the development of a sound body shall receive as much care as that of a sound mind; that the fact shall be recognized, and not only recognized, but acted upon, that a strong and healthy body will add greatly to the value of a well trained mind.

Within the past year the State Board of Health has been in correspondence with teachers and school superintendents throughout the state, with the view of obtaining authentic information concerning the sanitary condition of school houses and their surroundings. The means adapted to reach this end are elsewhere detailed, and we here present some few of the facts reported. To those who read carefully the statements made, it will be no matter of surprise that much illness and suffering should occur among the children who attend many of our public schools; with buildings in which no single sanitary precaution seems to have been taken, which stand on wet, swampy ground, which are wholly unventilated, insufficiently warmed, badly lighted and poorly furnished, with the utter disregard even of common decency shown in by far too many cases in out-door arrangements, no sanitarian will fail to see many causes of ill health among children, which to careless and superficial observation would seem inscrutably mysterious.

We regret that the space at our disposal will not admit of even a full synopsis of the reports in our hands; several hundred had been received at the time when this paper was begun, and many more have been added to the number since then. But the material *here presented* shows most conclusively that very many of our school houses stand in need of a thorough reformation in almost every respect which concerns the health of their occupants, and that there are very few which could not be improved in these same regards.

Examining about six hundred of the reports hitherto received, which represent school buildings of every grade in all parts of the state, and considering first the subject of their

SITES,

we find that in no less than *one hundred and thirty cases* out of the six hundred, or nearly twenty-two per cent., the first essential condition of a dry and elevated situation has been wholly disregarded, and the school house has been placed in a position utterly unfit for any building intended for the occupancy of human beings. That this language is none to strong, the following descriptions, taken almost at random, will testify:

"Soil, a red clay almost impervious to water; in wet seasons the grounds are constantly covered with water.— Site quite damp at all times; in spring and fall, water remains on the surface around the house; also for several days after a rain storm.— Surrounded on all sides by marshes on which water constantly stands; school house thirty feet only from the marsh.— Low ground, near a marsh and two ponds.— A marsh with stagnant water all around.— Close by the Wisconsin river; the ground at the foot of the knoll on which the school house stands is often overflowed, hence miasma prevails.— Soil clay; a marsh close by.— A marsh and stagnant pond, which becomes offensive in late summer, within twenty rods.—

A creek at the rear, which frequently covers one-third of the school-yard with water. — Water stands on part of the school-yard for days, and sometimes weeks together. — Soil cold and wet; *was* a swamp; is now filled up with sawdust, which is two or three feet deep on the surface; one hundred and fifty feet distant from the school house is a stagnant pool, while at twenty rods distance is a low tract, neither of which can be drained, and never destitute of filthy water. — Soil clay; surrounded by low marshy ground. — Marshes all around; school house stands in the middle of a marsh.— Basement holds water, hence throat difficulties prevail among the children. — Soil a black clay; holds water well. — School house stands in a swamp with stagnant water all around. — Soil a low, heavy muck. — Water lies on the surface the whole time except in very dry seasons. — Whenever it rains a pond is formed near the school house, which remains until it is removed by evaporation. — Low, wet ground, filled up with sawdust.

Such are some of the locations described, and accounts like these might be greatly multiplied. Nor are there wanting descriptions of undesirable surroundings of various kinds; surroundings not only of a character wholly incompatible with the quiet desirable for a school room, but dangerous to health and even to life. We quote a few descriptions of these:

"A bayou from the Mississippi river comes near the building; this bayou is a stagnant pool at low water, and is, moreover, *the cesspool into which the sewage of the city is poured;* it is very offensive in warm weather. — Four or five rods to the south of the school stands a cheese factory, the owner of which keeps a large drove of hogs; the odor from these animals is fully enjoyed by the occupants of the school, whenever the wind blows from any southerly quarter. — Site too near the railroad." The site, however, which probably surpasses any other in its assemblage of its undesirable surroundings, is thus described: "A frog-pond lies on the west; a hog-yard on the east; on the south side the railroad runs close to the fence, and a cemetery is just across the road on the north!" Comment on such a description is wholly needless, as are also any more extended quotations for the purpose of establishing the position that greater care than is exercised in many instances, should be had in selecting a site for a school house.

In our former paper we said that the

SCHOOL YARD

or play ground should have an area of not less than forty superficial feet for each pupil; that it was desirable to have the boys' and girls' yards separate from each other, and also to have a space devoted to the use of the smallest scholars. With very few exceptions the area named is much exceeded; in a large number of reports such answers as these are given: "Play ground not enclosed; area unlimited. — Play ground extends over the whole region round about the school. — The limits of the play ground are those within which the bell can be heard." And of those who make more definite statements, very few indeed give a smaller area per scholar than one hundred square feet. In a single instance only, however, is there any separation of the sexes, and in none is any part of the play ground reported as being set apart for the enjoyment of the little ones. Very many reports contain such statements as these: "Play ground covered with brush; fences badly out of repair. — Play ground open; but a small portion cleared, and that obstructed by the wood piles to a great extent.— Play ground decorated with old roots, stumps and saw-logs. — Covered with log heaps and similar rubbish." A very few report no play ground at all, but these constitute the rare exceptions.

There would seem to be no good and sufficient reason why every school house in Wisconsin should not be provided with a playground not only sufficient in size but neatly and substantially enclosed and attractive in appearance. Some few localities there are which report that the play-grounds are well fenced, sodded, and provided with shade trees, but those are in the majority who have not yet seen the advantages, both physical and moral, arising from well-kept surroundings. In this particular the teachers of the state can do much toward an improved condition of things; from them must come the impulse which shall tend to place the surroundings of Wisconsin school-houses on a level with those found in the older states.

It will be no matter of surprise, after reading what has been said of many localities, that little, if any, attention is paid to the matter of

DRAINAGE.

In a very large number of cases, the question relating to this important subject is answered by saying that none is needed, and this is said in some instances where the site is reported as being damp or wet. It is greatly to be feared that the importance of securing dry sites for any buildings intended to be occupied daily, is not generally recognized.

In a few answers in which the site was said to be drained, further inquiry developed the fact that reference was had to natural drainage only, the school house being built upon a knoll or side hill, so that the elevation of the land was deemed sufficient to secure all necessary facilities for carrying off water. We might add many many quotations showing the need that exists for thorough drainage in many localities, but space will not admit. Citations already made in regard to situations will suffice for the purpose.

CELLARS AND AIR SPACES.

By far too many buildings are reported as being placed directly upon the ground, with neither cellar or air space under them. In a very large proportion, moreover, of those which have air spaces, no means whatever is provided by which these may be ventilated.

One feature of Wisconsin school houses there is which is commendable. Very few rooms are to be found in public school buildings anywhere in the state to which the sunshine has not free access for several hours each day. Complaint is more often made that there are no means of excluding it than that it is wholly shut out. True, there are one or two rooms of which it is said that "the sunlight hardly ever gets into them," but these are rare exceptions.

HEIGHT OF BUILDINGS.

Time did not admit of an exhaustive comparison of all the reports upon this point, and accordingly those from twenty counties situated in all parts of the state were selected, as probably affording a fair representation of the whole. The result was as follows: Eighty-seven and one third per cent. of all the school houses in the selected counties are structures of one story only; eleven and three-fourths per cent. are two story buildings, and less than one per cent. are edifices of three or more stories, nearly all of the last two classes being found, of course, in the larger cities. This is as it should be; the only use that a building over two stories in height can serve, in a great majority of cases, is that of ministering to local vanity, while the injury which results from the too frequent climbing of stairs far outweighs any benefit, even if this be real.

Inquiry into the size of the buildings, with reference to their cubic capacity, reveals a much less satisfactory condition of things.

The number of cubic feet demanded *per capita* by our best sanitarians is not less than two hundred and fifty, and with this allowance the whole of the air in the room should be replaced by a fresh and pure supply at least once in every fifteen minutes. Concerning the existing facilities for ventilation, we shall have more to say hereafter; in this place we have to call attention to the fact that only about twenty-five and one-half per cent. of all the school rooms of the counties selected as representative, allow the cubic space above mentioned to each pupil, while no less than forty-six and eight-tenths per cent., or very nearly one-half, allow less than two hundred cubic feet *per capita*, the amount in some few cases being less than fifty cubic feet. Seven and one-half per cent only allow four hundred cubic feet or more of space to each pupil, while no more than nineteen and one-third per cent. in all give the allowance called for by very many sanitary authorities, of three hundred cubic feet or more *per capita*. In rooms of the dimensions of far too many described in the reports in our hands, good ventilation is an impossible thing, and this would be the case even if the best available means for removing foul and introducing fresh air were employed. What, then, can be expected when doors and windows are depended on as the sole means? And when, still worse, not even these are available, we cannot wonder that many children suffer in health; we are rather tempted to ask how it is that so many escape injury.

VENTILATION.

Upon the subject of ventilation we have so great a mass of testimony that the question what to exclude becomes an important one. We will not enter here upon the trite subject of the capacity of the lungs, how many barrels or hogsheads of fresh air should be allowed per minute or per hour, etc., etc., nor shall we discuss the relative merits of various systems of ventilation, great as these are, especially in the eyes of their several inventors. "The system of ventilation which will work automatically or without supervision, has yet to be devised. In other words, it takes *brains* as well as machinery to ventilate a house."* But where the means for ventilation that should be found in the poorest structure are wanting, even brains will fail; and that this lack is only too frequent, let the following extracts show: "When I took charge of the school, at first the room was closely ceiled overhead and *the windows were all nailed fast;* later, two boards were removed from the ceiling and the windows so arranged that they might be opened from the top, but the ventilation is still very unsatisfactory; danger to health arises from draughts from the windows, and from the door, which opens directly into the outer air.

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* Dr. D. F. Lincoln.

Ventilated through broken windows; satisfactory in fine weather, but compels teacher and pupils to migrate frequently at other times. — Windows firmly nailed down; ventilation is supposed to be effected by means of a tube three inches square running up from the ceiling of the main room through the roof; in summer, when the doors can be left open, we can manage to breathe, but in winter, when they must be closed, it is very hard work. — Ventilated only by broken windows. — Ventilator on top of the school house, but out of repair, and closed up. — There are four windows, each with a single sash containing six small panes of glass, and all so fastened as to be immovable; need I describe the *ventilation* further? — No intentional means of ventilation; the room is aired through the cracks over and around the windows, knot holes in the floor, and similar openings. — Abundance of air admitted through crevices caused by shrinkage of weather boards, etc., and openings left by falling plaster; not satisfactory. — Ventilated in theory by a tube four inches square, directly over the stove; in practice, by the cracks and crevices around the doors and windows. — Ventilated by means of a series of semi-circular openings made by ground squirrels and gophers for their own private entrances and exits whenever *they* attend school; system always in operation, and more than sufficient, especially in cold weather. — Too well ventilated for health or comfort, by means of cracks in the unseasoned flooring, weather boarding, etc. — Walls and floor form one vast ventilator; not a satisfactory one, however. — No means of ventilation whatever; windows, three in number, cannot be opened."

Some idea of the extent to which defective ventilation prevails *may be found from* the fact that nearly one-half of those who answer the question, how physical conditions may be improved, reply, "by better ventilation;" and further, that only *twenty-three out of six hundred* declare that the ventilation of their school-houses is satisfactory. And in this connection we quote the following extracts from reports made by city and county superintendents concerning the schools under their jurisdictions: Our school-houses generally have only such ventilation as can be attained through doors and windows; but, from the rude construction and poor carpenter-work of many of them, there is a constant supply of fresh air in cold weather, though it is not generally well distributed.— Our school-houses are ventilated only through doors and windows, except, indeed, the log houses, which are generally the best ventilated, or, rather, the most airy; some are ventilated through the wood-box, which opens from the outside and inside of the school-room; as this box is often the receptacle for the sweepings of the room, odds and ends from the remnants of lunch, etc., the air that passes through it can hardly be of the best and purest. —Ventilation only by windows; some school-houses have only the door.

We consider the ventilation of our high school building perfect, but more than half our school houses have no other provision for ventilation than doors and windows. In several a recess is formed by an entry projecting on either side, and directly in front of this recess a stove is placed; these rooms are ventilated by opening the windows in the recesses, so that the ingress of fresh air must pass the stove before reaching the pupils, and by lowering windows on the side opposite the wind; the air in all rooms is changed during each intermission. But when all is done these rooms are illy ventilated; in cold days the children live in vitiated air or are subjected to draughts."

This last quotation is from the superintendent of one of the most important cities of the state — a city in which probably more attention is given to the sanitary conditions of the schools than in almost any other of equal size in the country.

We may summarize the information given on the question of ventilation in our public schools, by saying that in no less than eighty-two per cent. the doors and windows form the only means of admitting fresh air; the remainder either are silent upon the subject or report that some form of ventilating apparatus, more or less effective — usually rather less than more — is employed. Of all who reply to the question: Is the system of ventilation satisfactory? more than seventy-eight per cent. answer in the negative; a very small number, about two per cent., that it is partially so, and the remainder, rather more that nineteen per cent., respond affirmatively.

It is worth noting that some of the patented systems of ventilation, which certainly seem good in theory, do not meet with much favor in practice. Several of these systems are reported as being in use in various parts of the state, the comment being very generally added that they are not satisfactory in their working — a comment which gives force to Dr. Lincoln's remark, previously quoted.

Closely connected with the subject of ventilation is that of proper

HEATING APPARATUS.

This should be made a powerful assistant in supplying a sufficient quantity of fresh warm air, but in very few school rooms does it render any aid whatever in this direction. In by far the larger majority of cases, the school room is heated by a box stove, or one equally primitive in design, which is placed at one end of the apartment, usually near the teacher's seat; the chimney is at the opposite extremity, and a pipe extends through the length of the room, in greater or less proximity to the heads of the pupils. Of the advantages of this system, let those speak who are fully competent to do so.—"The stove pipe passes directly over the heads of many of the scholars at an insufficient height; headaches are frequent from this cause; the lower part of the room is always wretchedly cold.—A box stove placed near one end of the room gives a great though not altogether pleasant variety to the temperature in different parts of the room; pupils removed from the room are uncomfortably cool; those near it as uncomfortably warm; teachers and scholars suffer from cold feet, and severe colds are often contracted.— When the school is full, it is impossible to keep the room warm and the air sufficiently pure at the same time.— In coldest weather a red hot stove is needed to counterbalance draughts and keep the room hardly fairly warm.— The floor is constantly cold and a dangerous draught comes on the heads of the pupils when windows are opened above.— I hope to see the day when stoves shall be banished from every school, study and recitation room in the land; they are the breeders of more ills than a swamp."

More than ninety-three per cent. of all the school houses reported upon are warmed by stoves; four and one-fourth per cent. are heated by furnaces, and no information is given concerning the means of warming the remainder.

It is undoubtedly true that stoves form the most convenient means of heating school houses in the large majority of cases, though they are far from being the most economical. In very many districts probably the only practicable arrangement for warming the school house is to place a stove of sufficient size in each room; a very simple apparatus, however, may be easily arranged which shall render the stove a powerful adjunct to proper ventilation. Such an apparatus is employed in several schools in the city of Fond du Lac; a fresh air duct is led into the school-room, which terminates under the stove; the stove is surrounded by a sheet iron jacket perforated with holes in such a manner as to insure the perfect distribution of the air which is detained in contact with the stove sufficiently long to become warm without being burned. A device very similar in character is in use in the schools in Arcadia and Galesville, in Trempealeau county, where also a foul air flue is placed in the chimney. In another town, air tubes are led from the upper part of the windows to a drum which surmounts the stove, through which the air is compelled to pass. In many cases a large stove might be placed in a chamber under the school-room; a proper air trunk should lead the fresh outer air into this chamber whence, by means of one or more registers it could be distributed to the rooms above. Any one of these simple and inexpensive methods would be a vast improvement on the present system.

By no means secondary in importance to any other point of school construction, is that of the

ARRANGEMENT OF LIGHT,

in which school houses are conspicuously faulty. We refer not to

Wisconsin school houses particularly in this respect, for we believe that an inquiry similar to that of which the results are here recorded undertaken in almost any other state of the Union, would develop an equally bad, and in very many sections a far worse state of things in every particular subject of investigation. As evidence of the truth of this opinion, we may refer to the reports of the committee on school hygiene of the New York State Medical Society recorded in many volumes of its transactions; to the reports of the Massachusetts State Board of Health, and many other similar sources of information. All this, however, does not mend matters as far as Wisconsin is concerned, or render it any less an imperative duty to inaugurate a reform.

The difficulty does not appear to lie generally in any deficiency of light, although instances of this are not wanting, so much as in faulty distribution. The large majority of school rooms, embracing over seventy-six per cent. of the reports examined, have window surfaces which range from one-half to one-tenth the area of the floor, by far the larger proportion reporting from one-sixth to one-eighth. There are, however, too many dark rooms — over ten per cent. reporting the superficies of glass in the windows at less than one-tenth of the floor surface, some giving the following extraordinary figures: one-fifteenth, one-sixteenth, one-twentieth, one-thirtieth, one-fifty-sixth, one-sixty-seventh, and even one-ninetieth! It is very difficult to believe that some of these are correctly reported.

Apart from the amount of light is the method of its distribution; greater injury to the sight may be done by too much light than by too little. By far the greater number of our school houses receive light from both sides, and not a few from in front of the pupils as well. In too many moreover the blackboards are placed between the windows, in favor of which position nothing whatever can be said; scarcely better, if at all, is the arrangement often found in which the blackboard extends not only across one end of the room, but on either side as far as the first window, so that the pupil who stands in front of either of the wings occupies a position such that he receives the light from the one window nearly full in his eyes, *while his* shadow is thrown upon the blackboard from the other!

To such faulty arrangements as these, and to others equally bad under which a large amount of study must be performed, is due the injury to eye sight referred to by so many teachers in schools of all grades. To the question, does sight often suffer, three hundred and twenty eight out of six hundred return an answer; one hundred and thirteen return in the affirmative without any qualification whatever, sixty-three give a qualified yes, five are doubtful, sixty-nine answer no, but with some reservation, and *sixty-eight only answer unreservedly in the negative.* We subjoin a few of the answers.

In this school sight has suffered in an unusual degree; I think from long experience that it generally does suffer from school work. — Several have received injury from which they will not recover without careful attention. — Sight has suffered very much here. — Sight suffers very often; pupils leave school on that account. — Sight often suffers; our school rooms are seldom properly lighted. — Very often see weak eyes from over study. — Suffers very often, especially in the younger pupils. — Suffers very often and very much. — It must and does suffer in a majority of cases. — Sight must suffer whenever light comes from both sides, as in the case here. — Sight suffers in many cases where the windows are unprovided with screens, or other means of regulating the light. — I find more defective sight than I had supposed possible; have thought that examination work on the blackboard taxes the sight unduly. (In this school the blackboards are between the windows.) — Sight suffers to a greater or less extent in all our schools. — There is a decided tendency to weakness of sight here; perhaps five west windows, all of them unscreened, may have something to do with producing it. — Pupils often become near-sighted.— Sight unquestionably suffers very often." Very many answer simply "yes," without any additional remark; in almost every instance where this is the case, examination shows that the room is lighted in some injudicious manner — as, for example, right and left hand and front, front and rear, all around, etc.

We may note one or two remarkable exceptions to the general run of the answers received; one says that the sight does not suffer except from want of use; a second who has never known sight to suffer, describes the room as having only two small windows, one on each side; a third reports that the school holds its sessions in a basement which is dark and damp, where the blackboards are placed between the windows, which are on three sides of the apartment, but that sight has never suffered, notwithstanding these adverse conditions. In these and other similar cases there is either some fault of observation, or else a special Providence watches over the sight of the fortunate pupils. We believe, however, that we have said enough to show conclusively that the danger is great of serious and lasting injury to the sight of very many of the children in our public schools, and that it is none too soon to apply a remedy.

SCHOOL ROOM FURNITURE.

In discussing the various circumstances which affect favorably or unfavorably the health of children at school, the arrangement and form of seats and desks must not be overlooked. Great as is the advance in the furnishing of our school rooms in many particulars within the last ten or fifteen years, we have not yet reached perfection in this matter; comparatively few of the many patterns of desks and seats to be found in use in our school houses even approach the decently comfortable. In furnishing a school room one of two courses is usually followed; the services of the carpenter or builder are called into requisition, and certain instruments of torture are constructed out of pine boards, upon which the children of the district are made to do penance for a given number of hours each day, or competition is invited from various large manufactories, and the establishment which engages to do the work for the least money obtains a contract; in this latter case the school room is provided with the greatest possible number of zebra-like arrangements in light and dark colored woods, and the board of education and the citizens vie with each other in expressing their wonder at the great improvement made in school room fittings since their own school days.

In neither case is the question asked, "What is the relation of the curves of these seats to those of the human body?" Nor is any attention paid to the facts that children of various ages and sizes *are to occupy* these seats, and that very much of the ease or difficulty with which a school room is controlled is dependent upon the physical comfort or discomfort of the pupils. With regard to the furniture actually in use in many schools in Wisconsin to-day, the testimony from many teachers and superintendents is full and explicit. We quote: "Seats vary in height, the lowest being twelve inches, the highest eighteen inches; old-fashioned, seat and desk united; made of pine lumber, by an ordinary carpenter.— Seats old-fashioned, uniform in height.— Seats vary, but the desks are all of the same height.— Desks are all of uniform height; about fifteen pupils out of twenty-six, when sitting squarely on the benches, *cannot touch the floor with their toes.*— Seats nearly all of different heights, but clumsy, awkward, straight-backed, and hard to sit upon; some of the desks are so high that the scholars' chins are just upon a level with them, when seated; unfit to sit at, to study at, or to write upon.— Seats uniform in height and inconvenience.— Uniform in height, though not *accurately* so.— Seats and desks very inferior; seats very high and desks very low. — Seats vary in height, but are constructed upon the old monastery chapel plan, and tip up if any one becomes sleepy, inattentive, or fails from any reason to give his mind to the preservation of his balance. — Seats vary in height, but none are low enough to allow the smallest scholars to rest their feet upon the floor.— *Seats* are uniform in height, all allowance being made in the varying height of the desks.— The seats are all graded to the size of the pupils, but the models for many of them were probably borrowed from some of the implements of the Spanish Inquisition. — Seats and desks are of rough pine, are uniform in height, and the desks are placed so far away from the seats as to render it very difficult to write at them. — No allowance is made in height of seats and desks for varying size; the seats are all fourteen inches high, the desks all twenty-eight inches.*— The height of the seats, which is the same all through the school, was selected with such singular ingenuity that the smaller scholars can just teach the floor with their toes, when seated, while the seats are all too low for the larger ones, so that they are miraculously uncomfortable all round.—

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* A desk at which an adult can write with comfort, is not more than one foot higher than an ordinary chair.

The seats vary considerably in height, ranging from one foot ten inches to two feet, seven! — Sixteen seats, and in winter fifty-six pupils. — Seats genuine antiques; all of the same height and from five to seven feet long. — School seats and desks in this town are an *abomination*. — *Two seats* are provided which are somewhat lower than the rest; hardly sufficient to accommodate the whole number of little ones. — Desks and seats are alike, and, like the building, made of rough boards roughly nailed together — such, in short, as might have been found in a log school house fifty years ago. — The seats were made to accommodate grown people, who use the building for church purposes, and are all of the same height. — There are neither seats nor desks, nothing but a few rough benches. — Seats are uniform in height, and very illy proportioned at that, being sixteen inches from the seat to the floor, and ten inches wide; distance from the front edge of the desk to the floor, thirty-four inches; the desks are all so high that my largest scholars when seated at them cannot rest their arms upon them without raising the shoulders."

We might continue these quotations indefinitely, but have probably offered evidence enough to show that in the matter of furnishing our schools there is ample room for improvement. Some, however, may say: "Admitting the truth of all that has been said, and supposing that it applies to every school in Wisconsin — what of it? Has it any permanent effect upon the health of our children, and if so, what is the effect, and how far does it extend?" We may quote in answer from papers published in Germany, where the question has been thoroughly investigated within a very recent period.

"Almost ninety per cent. of all the spinal distortions which come under the physicians' notice begin during the years of attendance at school, and since their character corresponds exactly with the position occupied in writing, we are justified in regarding the school as the place where the disease originates." * Other observers† concur in this view, and give figures which place the conclusion beyond all reasonable doubt. But not only is spinal distortion

* Fahner on "The Child and the School Desk."

† *Guillaume*, Eulenberg, Klopsch, Knorr, and others.

a consequence of ill-suited desks and seats; pulmonary disease often results from the same cause. In very many cases where the desks are too low for the seats, a position is assumed, almost inevitably, in which the chest is contracted, the free play of the lungs prevented, and the foundation thus laid for disease of the most formidable character.

Even though nothing of this kind resulted, the daily and hourly repeated discomfort, the more than discomfort — in some cases the absolute torture inflicted upon the unlucky youngsters who are compelled to occupy the badly modelled and worse constructed seats too often to be found in our school houses, would be a sufficient reason for demanding a change. Many parents will testify that the weekly reports brought home by their children, while showing fairly high averages in the various studies pursued, almost constantly bear low marks in what is called " deportment." If the teacher be asked for an explanation, some such reply as this will be given: " He is fidgety, restless; it seems impossible for him to be quiet." It not only seems, it *is* impossible; let any one try the experiment of sitting even for one half hour upon a seat such as many a school house can show, and he will feel no further wonder at the child's inability to remain quiet. Provide reasonably comfortable seats, and the teacher's labor in controlling the school room will be greatly lightened in very many cases. The greatness of the need of an improvement in this respect is indicated by the fact, that in answer to the question, what can be done to improve the physical condition of children in our schools, no less than seventy-five teachers reply in substance, " Give them better and more comfortable seats and desks," more than one adding the wish — to which many will say amen — that " those who made, and those who are instrumental in keeping in use the present styles, might be compelled to occupy them."

A defect found in almost every school house in the state, is the bad arrangement or the total absence of

HAT AND CLOAK CLOSETS.

In by far the larger proportion of our schools none whatever are to be found, rather more than eleven per cent. only reporting that they are provided; in a little over twenty per cent. the entries are made to do duty as cloak rooms, and in the remainder there is no provision whatever made. Even in the few buildings which are furnished with closets, the accommodations are incomplete; scarcely one reports any means of warming them other than by the scanty amount of heat that can be spared from the main school room, and very seldom is there any proper method of ventilation. Diagrams of some of the most costly, and presumably the best school houses in Wisconsin, show that too often the cloak rooms are sandwiched in between the main halls and the school rooms, without light or ventilation, except such as can be obtained by means of small transom windows over the doors which lead into entry and room respectively.

Instead of a well lighted and thoroughly ventilated room of sufficient size, provided with at least twice as many hard-wood pegs as there are scholars (these being placed at a proper distance from each other, and sufficiently low to be reached by those for whose use they are intended), and furnished with low seats to enable children to put on overshoes with a reasonable degree of comfort, having an independent register, or other source of heat, so that damp or wet outdoor wraps may be dried during the school hours, proper racks for umbrellas, and similar conveniences, we find either a dark, unventilated hole, sometimes under the stairways, sometimes in the position already described, with a few cast iron hooks scattered here and there around the walls, the greater part having been broken off from time to time, and never replaced; upon these the larger or stronger can hang shawl, overcoat and water-proof, and perhaps also hat or cap; while the majority, of smaller stature, have liberty to deposit the outdoor wrappings on the floor; or nails are driven into the window casings or walls of the school room, on which may be hung the hats and cloaks of a few fortunate ones, while those of the remainder find room in the desks, or oftener do duty in softening the asperities of the hard, ill-contrived benches through the hours of study. If the day be wet, happy are they who can dispose of their outdoor garments around the stove; the rest must use the heat of their own bodies to dry their wrappers, or *put them on at the* close of the session unchanged as to condition except that the dampness is more equally disposed than when they were taken off. *We have not a single school building in the state of Wisconsin in which any provision for drying wet clothing in bad weather is reported.*

"Often," says one report, "both teachers and scholars are obliged to remain in wet or damp clothing until it is dried by the heat of the body; even if a fire be kindled in the school room, but few can avail themselves of it at one time, and the rest must suffer; in many cases, moreover, it is not practicable to have a fire started at such times." Several others say, in substance, that comfort and health would be greatly promoted "by adopting some means which will render it unnecessary for children to pass the greater part of the school day with wet, cold feet, and damp garments, whenever the weather is bad." The need is so obvious that the wonder is that it should be so generally neglected.

We now approach probably the most dangerous defect of our school accommodations, and the one of which it is most difficult to speak at once with the directness and plainness which its importance demands, and without transgressing the limits of propriety. The results of this deficiency are far-reaching; not only are the very foundations of physical health sapped, but that modesty and purity of mind and thought, which are far from being the least of the virtues of childhood, are undermined and destroyed. We speak of

OUT-DOOR ACCOMMODATIONS.

"It has been well said by distinguished authority, that the true test of a nation's civilization is to be found not in the splendor of its public buildings, but in the neatness of its privies. Not only for immediate health and comfort is it right that in these respects the arrangements at school should be faultless, but as a part of the hygenic and æsthetic culture of the rising generation it is no less so. If the children for years are trained in barbarism, how will it ever be possible to correct the evil habits transmitted from the past? If, on the other hand, they are accustomed to neat, cleanly and comfortable conveniences, they become in due time efficient aids in sanitary progress." *

* Dr. J. B. Lindsley in Rept. of B. of H., Nashville, Tenn.

A dignitary of the Episcopal church has drawn a picture which will faithfully represent the condition of things in many a school district in Wisconsin to-day. "As one travels through the rural districts," he writes, "certain things are everywhere met with that are revolting to delicacy and offensive to the senses of a civilized man. Neat school houses are seen all along the roads, attended by boys and girls together; but there is often no retiring place for either sex, or else there are two small sheds situated in open view, not fenced off or concealed in any way. The scholar who would step aside is exposed to the observation of the other scholars and of the passers by; the houses are neglected and filthy.

Just here begins a child's education in other things than the spelling book. He becomes familiarized with an immodest publicity, and reconciled to unwholesome sights and smells. I remember once to have officiated in a new school house, pleasantly built and shaded, on which the neighbors prided themselves; but there were no accommodations of the kind referred to, and the region behind the house was simply disgusting. Having opportunity later in the day to converse with some of the trustees, I suggested how easy it would be to fence off the corners of the yard and make decent and suitable provision, and I waxed somewhat eloquent in urging the value of teaching children early, modest and delicate ways. When I had finished, the great man of the neighborhood replied that it was hardly worth while because, said he, '*the children is young!*'"

More than seven per cent. of the schools whose reports are considered in this paper, have no privy accommodations of any kind, *while boys and girls, promiscuously, are compelled to make use of the same apartment in no less than twenty per cent.* For such a state of things there is absolutely no excuse; it is disgraceful in the extreme to any civilized community, and, if no other means will effect a cure, it should be reached by stringent legislation. No school district should participate in the distribution of state moneys unless good and sufficient privy accommodations for each sex were provided, in the proportion of at least one privy seat and one urinal stall for each twenty boys, and one proper seat for each twelve girls resident in the district, and, what is too often neglected, provision should be made for the full enforcement of the law; such measures would do away with this foul reproach to our people in a single year.

Even where some approach to adequate provision is made, proper privacy is too often found wanting. Fifty-eight per cent. of the reports say that the privies are unscreened from weather and from observation. Many a modest and delicate child will suffer as long as possible all the tortures consequent on unrelieved bowels and bladder, rather than enter one of these exposed structures, and the injury done in this way is beyond belief by those who have not examined the matter. Neither is this the full extent of the harm done; when the natural shrinking from observation is overcome, as it must perforce be in time, then comes the injury resulting from exposure to cold, in buildings "entirely too open to be fit for use in cold and stormy weather. — Offering little protection from the weather, and in winter generally filled with drifted snow. — Unprotected by any means from the weather, and after a storm too damp and wet to be fit for use.— With cracks in the walls wide enough to allow a great deal of snow to drive in during a storm, thus rendering them extremely uncomfortable, and giving rise to dangerous exposure." We forbear giving further quotations, although such descriptions are abundant; probably there are few of our readers who cannot match the above from their own personal knowledge.

How can modest preserved in structures which are "open and facing the road, close to which they stand.— Wholly exposed to public view.— In full view from the road and from the school house windows?" Yet worse are] districts of which it is said: "There are no privies and never have been; all fare alike in the brush.— The woods around serve as a very poor substitute.— The exposure is shameful," with which conclusion all must agree. Such accounts are by no means the worst that we have received, but they are quite enough to indicate the need of a reform.

Even in cases where comparatively good buildings are found, neglect is still chargeable upon some one in the failure to pay due attention to cleanliness. "They are unspeakably filthy, and a disgrace to the place," says one, and others bear similar testimony. "It is only ten steps from the school house and is unfit to enter.—

Smells horribly.— Their condition baffles description." Were it not for the fact that such scourges fall alike on the innocent and the guilty, we could almost hope that some pestilence might appear in some of these districts and drive their inhabitants to better things; this has already happened in one locality with the result thus recorded. "Just now the privies are kept very clean; malignant diphtheria prevailing in the village." Only some fearful lesson like this seems to be heeded in too many places.

Insufficient accommodation is too often reported, and in localities where we should look for better things. A few instances are subjoined: "A structure three by six feet, in one apartment only, for forty pupils; no screen, no proper care for cleanliness, and no provision for needs of little ones.— Privy five feet by nine, for one hundred and eighty-three pupils.— We have two hundred and fifteen pupils in daily attendance, but our privy is only six feet by fifteen.— The privy measures six by ten feet outside, and we have three hundred and twenty pupils!"

Very seldom is any provision made for the needs of the younger pupils. Thirteen per cent. only report that any such provision is made at all, and a very large proportion of this small number add, that it is very inadequate.

Disgusting as these revelations are, we have not yet reached the end of them. We learn of privies placed so near the main buildings, that whatever care might be given them they would still be nuisances. "Twelve feet from the school house; generally neglected and odor disagreeable. — Eight feet from the main building; no care taken to keep them dry, clean or comfortable. — Six feet from the school house; both in full view of the road. — *About one foot from the wall of the school house*, and so offensive that in warm weather the windows cannot be opened." Privies fifteen, sixteen and twenty feet distant from the main building are quite too common to call for any special notice, nor are instances very rare in which the privy is built upon higher ground than the school house, with no vault at all, or with "a few shovelfuls of earth turned up as an apology for a vault." Neither are those very exceptional which are in dangerous proximity to wells or other sources of water supply.

Lest we should fail to give what limited share of credit is due we quote from some of the reports received in which some redeeming features are described. From Baraboo we have this satisfactory description: "A two story brick building thirty feet in the rear of the main school house, with which it is connected by covered ways; it is thoroughly cleaned at least once a year, and kept comfortable at all times; raised platforms or foot-stools are provided for the younger pupils." In one or two places a modification of the earth system is in use. "Large wooden drawers that can be taken out from the rear of the building serve in place of vaults," says one; and another, in which it is almost the only commendable thing described, says: "There is no vault, but a large drawer is provided, which is removed and cleaned at least twice in each term." No good reason can be urged why some such plan should not be generally adopted, nor can there be any reason for the toleration of many such abominations as those described, to say nothing of others with an account of which we have not ventured to astound the reader. Far less can there be any reason why both sexes should be compelled to use the same apartment, or why all alike should be forced to violate their innate sense of decency and outrage all modesty by repairing to such chance shelter as they can find, or else to suffer the torment of unanswered demands, to say nothing of the risk of permanent and irreparable mischief.

Here, too, we would put in a protest against the error too often fallen into by teachers of refusing requests to leave the school room. A recent writer in a health journal speaks so well upon this point that we quote without apology: "If a pupil desires to be excused from the school room, the teacher should be absolutely certain that his physical necessities do not demand his absence, before refusing the indulgence. A teacher has no right whatever to refuse such a request, unless he knows absolutely that the case is one of truancy; if he err at all, let it be on the safe side; better thus to err a hundred times than once to be the cause of physical injury." And what Herbert Spencer has said of another matter will apply with equal force to this: "Has the teacher any secret understanding with the child's body — any *clairvoyant* power enabling him to see all its needs with exactness and precision? If not, how can he safely decide? Does he not know that the demands of the system are determined by numerous and involved causes, and how can he calculate the result of such a combination?"

WATER SUPPLY.

It is hardly credible, but is none the less true, that the greater part of our schools have no source of water supply of their own, but are compelled, as one of the teachers reports, to rely on "patient and long suffering neighbors." More than sixty-one per cent. of our schools are in this predicament, and this is not the worst feature, for in more than fifteen per cent. of these, water must be brought from distances ranging from one-fourth to three-fourths miles. Such facts do not speak well for the people of a district of which they are told. We learn, moreover, that water in one instance is obtained "in summer from an adjoining marsh, at other seasons from a well distant one-half mile; a single pailful brought in the morning forming the day's supply." Again, it is drawn from "a creek which flows through two barnyards before reaching the school. — From a well in the valley below which receives all the drainage of the barn yards. — From a well dug in a side hill below the privies. — From a driven well in the basement of the school, the *only possible contamination of which is from filtration from the privies.*" Our narrowing space warns us to stop, but the material for quotation upon this point is far from being exhausted. Enough has been said, however, to show that the note of warning sounded by Dr. Witter in the last report, was by no means premature or needless.

With regard to one of the remaining points that fall into our province for discussion, that of the effect of the advent of puberty, opinion seems to be too widely divided to admit of any satisfactory conclusion. The most experienced of the many experienced educators with whom we have been in correspondence, appear to incline to the belief that if proper caution be exercised there is very little increase of danger at that epoch. Still most of them speak with caution, and it is perhaps too much to say that a *majority* hold that view.

Upon the question, "How can physical conditions be improved," we have received a mass of opinions, very many of which are worthy of careful consideration. They may be classified to a certain extent, and when this is done the following appears to represent the paths which must be pursued to attain the end. Better ventilation, better school buildings, better furniture, more out door exercise, improved heating arrangements, greater attention to cleanliness of person, gymnastic and calisthenic exercises, better lighted school rooms, more care as to food and diet, proper attention to clothing, and shorter school sessions. These are named in the order of their importance. as indicated by the number of those who recommend them.

Some there are who think that the physical conditions of the children in our common schools are not susceptible of improvement; that the point of perfection is already attained; but these are few. Yet others think that by putting on a greater pressure, by giving less time to recreation and play, that good results may be reached, one of this class urging the improvement of physical condition "by gymnastic exercise in school, and by parents seeing to it that as soon as children return home from school they shall be set to work at hard labor of a useful kind!" Those whom this gentleman represents are also in a decided minority. Several suggest that proper instruction in the laws of physiology and hygiene be given to parents by means of popular lectures, to teachers at institutes, and to children by means of general exercises in the school room. The opinion that a change in the law is desirable, making the school age begin at six or seven years of age instead of four, finds quite frequent expression, as also does that of "doing away, partially, at all events, with the high-pressure *stuffing* system, now so much in vogue, by which a child is called upon to learn so much in a given time, regardless of natural capabilities."

We regret greatly that we can give no further quotations from the many replies to the questions on physical improvement, but their general scope is pretty clearly indicated in those already presented. There are other special replies of marked interest and value, which, however, our space compels us to omit.

There is yet a question of a high degree of importance to be considered, and with its discussion we shall bring our present labor to an end; it is that of the means employed for

THE PREVENTION OF CONTAGIOUS DISEASE.

These means might riefly be disposed of by saying that, practically, there are none. It is true that we find many such reports as these: "Contagious diseases are met by the use of disinfectants, by suspension from school, and by closing school.— The board have rules to prevent admission of pupils from infected families;" but in the vast majority of cases nothing whatever is done.

"Pupils who have been exposed to contagious diseases are sometimes kept at home; others have been sent home *after such a disease has made its appearance*, but people generally show great indifference to any matter of the kind.— No means whatever are employed to prevent the spread of contagious diseases; children having them are allowed to come to school as freely as others.— Contagious diseases are not combated by any systematic proceedings; many cases of scarlet fever and diphtheria now exist in this neighborhood, but fortunately none have as yet appeared in the school." Such are some of the answers returned to the inquiry concerning the restriction of diseases, many of which are known to be preventible by isolation. The results of this deplorable want of caution are shown in such quotations as the following: "No means are used to prevent the spread of contagious disease. Diphtheria has raged fearfully in this neighborhood during this spring ('79), and the *doctors had no success in preventing its spread.*— Diphtheria appeared in this district in December, 1878, and took off ten scholars; the winter term was soon broken up for want of pupils. At this date the summer term has just commenced, but diphtheria still prevails."

Strange to say, there are those who, in the face of these and other well established facts to be more particularly mentioned hereafter, use such language as this: "I think that the clamor that is raised against the schools as sources of infection is simply peopling the graveyard. Whenever contagious diseases prevail, hundreds of children from non-infected houses are withdrawn from school, only to congregate with children from tainted houses on the skating ponds and play-grounds."

That a teacher of large experience, a gentleman of more than usual intelligence and high education, can speak thus, is an additional evidence of the need for popular instruction that prevails. Few facts are better established than that the danger of contracting any contagious disease is greatly diminished by diluting the poison, whatever be its character, that produces it; certainly the risk of contagion in the open air, upon skating ponds, etc., is infinitesimal as compared with that incurred in overcrowded, badly ventilated school rooms. Physicians well know, moreover, that the opening of the schools in autumn is too often the signal for outbreaks of scarlet fever, measles, whooping cough, diphtheria, etc., among the children who attend them, and evidence of the same fact is contained in the records of the State Board of Health.

We are well aware of the difficulties which must be overcome in solving the problem of how best to meet the dangers of contagion in the school room. We know, however, that these difficulties have been met in many places, and that there is nothing in the way of their solution which cannot be overcome in Wisconsin as well as elsewhere. In the few attempts that are made to prevent the sick from mingling with the well, failure often results from the fact that no competent authority is charged with the duty of making and enforcing the needed regulations. These should be simple, comprising the absolute exclusion of not only those affected with contagious disease, but of all from the same family and the same house, for a length of time sufficient to insure their schoolmates from danger, and a thorough disinfection of the person* and clothing prior to re-admission. Inasmuch as teachers and members of district boards have very seldom the knowledge requisite for carrying out these precautions, their execution should be placed in the hands of a competent physician, who should by preference be the health officer of the district. Something very much like this has been done in the city of Rochester, N. Y., where the difficulty and cost of such measures must be enormously greater than they can be in smaller communities, with the most gratifying results.

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* In the disinfection of the person, the hairy scalp is frequently overlooked; the whole body is bathed and thoroughly cleansed, but the head receives little, if any, attention. A child may easily scatter the germs of disease widely among his school fellows in consequence of this neglect.

We have desired in this paper to call attention to some of the most conspicuous of the evils that surround the public school system of our state, no one of which, however, is inherent to that system. "No subject can be of greater importance to the state, or of more vital and anxious interest to every family in it," than the health of the children to whose hands every interest of the state must soon be committed. Much of the injury that is sometimes attributed to school life and school work is doubtless due to thin-soled shoes, tight corsets, late parties and exciting novels; it is also true that "many over-eat, over-party, and under-sleep;" but when everything is said, when all deductions are made that are justly chargeable to other scores, a large residue will be apparent for which the faults of school are responsible.

We do not look for perfection, but we have a right to demand that such blots on our school system as are some of the buildings described in reports in our possession, shall be done away with; that school houses which measure "twelve by twelve feet, with three small windows, and the same number of rough benches, one on each of three sides of the room, with no outhouses of any kind, and with no source of water supply within half a mile," * shall not be considered proper places in which to instruct our children.

"The schools of our state are an incalculable blessing to the state and to every citizen. IT IS BECAUSE THEY ARE SO PRECIOUS THAT IT IS WORTH OUR WHILE TO SCRUTINIZE THEM CLOSELY AND NEVER TO CEASE OUR EFFORTS TO IMPROVE THEM." †

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* The above is taken from the report of a correspondent in one of the wealthiest counties of the state, who says: "There are several school houses in this county as bad as this. I mention the fact because you will probably receive no report from any of those districts." His opinion was correct; we did not.

† Dr. Fred. Winsor, in 5th Mass. Report.

GROUND AIR,

IN ITS RELATIONS TO HEALTH.

BY G. F. WITTER, M. D., of GRAND RAPIDS.

Not only are we immersed in the atmospheric ocean as we live and move upon the surface of the earth, but the earth itself is penetrated to an unknown depth by the same mighty sea, and the air contained in the soil is affected by the same causes, subject to the same movements, as the vast body above it. And this air in the soil no less that above, affects our well-being in very many ways which usually receive but little attention. The remarkable experiments of Pettenkofer, to be hereafter described, show in a striking way the facility with which air passes through even very compact soils; and an American experimenter, we believe, following the same line of research, has shown that some at least of the rocks composing the crust of the globe are permeable by air in a very high degree. In the ground air, as in the atmosphere, the principal constituents are oxygen, nitrogen, carbonic acid and watery vapor, but their relative proportions seem to be by no means as constant; and the few observations which have as yet been made, appear to tend toward the conclusion that the uniformity remarked in the constitution of air in different localities in the upper atmosphere is wanting in the ground air in far larger proportions than in atmospheric air, as also are carburetted and sulphuretted hydrogen, in some localities at least.

Prof. W. R. Nichols, of Boston, Massachusetts, has made some investigations into the constitution of the air in the soil, analyzing it at different seasons of the year, taking samples at varying depths below the surface, and at times when the level of the ground water differed widely, finding that the proportion of carbonic acid varied very greatly from time to time, seeming, as a rule, to be larger as the level of the ground water fell, and also to vary with the seasons being greater, as might be expected, in summer, when processes of decay are more active than in winter; the number of observations as yet made, however, are too small to establish any definite law. Prof. Nichols says: * "At present it does not seem possible to draw much useful information from the determination of carbonic acid in ground air. As the number of determinations increase and the laws of variation are better understood, it is possible that it may be found to connect itself with causes and effects of sanitary importance."

When it is remembered that the soil forms a receptacle for a vast amount of decaying matter, both of animal and vegetable origin, that in large communities all excrementitious substances are deposited therein, the important influence which ground air may have upon health will be sufficiently apparent. Says Dr. Griffin, in the last report of this board: "There is no habit so open to criticism and so reprehensible as the neglect of proper and timely removal of human excreta, which are allowed to reaccumulate in near proximity to the dwelling for years and oftentimes for a whole generation."

Dr. Reeve, in the same volume, uses this language: "Many of the homes of the more careful and better instructed among our citizens are subjected to an influence of the most undesirable kind, emanating from the dwellings of the more ignorant and neglectful — indeed, from those of the most filthy and careless among the population; from these last are poured, into sewers and drains, masses of putrescible filth, from which are given off foul vapors of all kinds.

"Following the laws which regulate the diffusion of gases, these find most easy access to the houses which, in winter, are best provided with the means of producing a warm atmosphere within them, and thus by the very means used to secure comfort, foul gases are drawn into these dwellings to mingle with the respired air."

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*Sixth Annual Report, Mass. State Board of Health.

Both of these warnings are true, and worthy of close attention; but there is a means whereby the air of our dwellings may, and doubtless often does, become foul and disease-producing; a means closely allied to those above pointed out, but more subtle, less generally glanced at, and therefore, if for no other reason, potent for evil; but it has a power of its own which renders it as deadly as any other one of the many dangers which lie so thickly all around us, and which it is the business of the sanitarian to point out and remedy, so far as remedy may be practicable. We have said that the movements of the air in the soil are governed by the same laws which regulate the movements of the great ærial ocean at the bottom of which we live; every rise and fall of the barometric column, every movement caused by change in the temperature of the superincumbent mass, is promptly responded to in the subterranean atmosphere; and this is true alike of general and local changes.

We kindle fires in our dwellings, and by so doing rarefy the air in them; straightway there rushes in, not only the surrounding atmosphere through open doors and windows, cracks and crevices, brick and plaster walls, but there rises from the ground beneath them a column of air charged with what? Consider the condition of the ground, regarding for the moment the surface only, immediately surrounding so many dwellings; perhaps public opinion compels some attention to cleanliness in front of the house, but look at the back door yard; here all the house slops are thrown out upon the ground as the quickest way of disposing of them; layer upon layer of decayed potato peelings, cabbage leaves and onion tops; the remains of many a wood pile in the shape of half rotten chips, fragments of bark, etc., are scattered there; the barn yard is close by, and upon its surface lie the droppings of the cow and the horse, which, to make the matter still worse, is being extensively — though thoughtlessly — used for banking up the cellar walls of many suburban homes.

Perhaps a pig or two and a few chickens have added their quotas to the mass. Not seldom the privy is a structure wholly guiltless of a vault or of any means whatever for receiving the daily excreta of the family, which lie wholly on the surface, an offense to sight and smell, to decency and health. If there be a vault, as that addition is usually constructed, matters are by no means improved thereby; such an operation as cleaning it out being unheard of and unthought of. Coming into the house and descending into the cellar, do we find things greatly better there? "In it have been stored for years, perhaps, all the potatoes, turnips, cabbages, onions and other vegetables for family use; milk and cream, pork and beef, sauerkraut and vinegar have met from time to time with various accidents, and from time to time themselves or their juices, in various stages of decay, have been absorbed by the soil of the cellar bottom. The cats, so neat and peculiar in certain habits, have slept there to fight the rats and mice who have had their little homes in and behind the walls since a time when the memory of a rat runneth not to the contrary; and the sinks, for a longer time, perhaps, have poured their fragrant fluids into the soil close by."

Up through the porous soil thus contaminated, is drawn the air which penetrates the whole house and is breathed by all its inmates! But as if this were not enough, the soil all around is polluted in various ways. Privy vaults and cess pools, with their soakings and stenches, imperfect drains, the marshy grounds close by and the old grave yards — all have contributed to make up the filth-sodden mass upon which men live, and from which come at least some of the effluvia which too often cause disease and premature death. "Pure water, pure air and *a pure soil* are the conditions of healthful life," but neither of the two first named is possible without the last.

Does any one doubt that the air beneath participates in — sympathizes with all the movements of the air above the soil? A very simple experiment, first devised by Pettenkofer, will convince him of the fact. Procure two tubes of about 1½ or 2 feet in length, the one closed at one end, the other open at both ends, and of such a diameter as will allow it to pass readily into the closed tube, and leave an annular space all around; bend the smaller tube into a right angle at a few inches from one end, and place it inside the larger, filling the space between the two with soil, packing it down as closely as possible. Provide next another tube bent into the shape of the letter U; attach this by means of an india rubber coupling to the right-angled bend of your smaller tube, and pour a small quantity of water into the bend of the U tube, which will complete the apparatus; of course the water in both branches of the U tube will stand at the same height.

Now blow gently either through a small tube or with the lips alone, on the surface of the soil packed into the largest tube; instantly the water in the U tube shows a difference in pressure between the two limbs by rising in the farther branch. The experiment may be varied and rendered simpler at the same time, by dispensing with the U tube, and placing a lighted candle at the opening of the small, right angled tube; the candle flame will respond to every breath directed upon the surface of the soil.

Yet another experiment, similar in kind, and perhaps more striking in its effect, may be tried; procure a tube of two or three inches in length and of almost any convenient diameter — a portion of a broken kerosene lamp chimney will answer a very good purpose — and fill it with mortar or common wall plaster in a wet state, just as it is prepared for use. Let it become thoroughly dry and hard and then adapt a small funnel to each end, making all joints air-tight; it will be found no very difficult matter, by placing the small end of one funnel in the mouth and blowing strongly, to produce a current of air through the hardened plaster which shall make itself evident by its effect upon a candle flame placed before the smaller end of the other. Compare now the feeble effort which the human lungs, even when most powerful, can make, with the force exerted by the wind, and the small area on which the breath is directed in the experiments above described, with "all out doors," and there will be no difficulty in admitting that every breeze that blows and every change in barometric pressure is faithfully reflected by the air in the soil.

Nor is this all; when our fires are kindled in the winter, it is by no means an uncommon practice to bank up our houses with earth, or other and much more objectionable material, and to render them otherwise as air-tight as possible; the fires rarefy the air all through the house, and this rarefication causes an inward rush from all quarters; the walls are not infrequently lined with tarred paper, or other impervious material, and doors and windows are fitted with weather strips; all these arrangements being intended to keep the house warm by the exclusion of outer air. If a door leading into the cellar be opened, a rush of air takes place, and we may easily satisfy ourselves that air is forcing its way into the living rooms from that locality by holding a lighted candle in front of any crevice which communicates with the underground territory.

Whence does this large body of air come? The outer doors of the cellar are often double, and are as carefully guarded as any other against the invasion of the dreaded enemy; very little reflection is needed to show that it must come in large measure from the ground beneath. "The whole house is a huge chimney," into the lower part of which the air forces its way in obedience to well known laws, thence rising to all parts of the house and diffusing the odors, or the non-odorous, but not the less poisonous gases, with which in its passage through such a soil as that described above, it has inevitably become mingled, and perhaps, too, the germs of typhoid or scarlet fever, or some other one of the numerous class of zymotic diseases.

Is there no remedy for this state of things? Undoubtedly there is. There is no instant of man's life in which he is not surrounded by dangers, seen and unseen, against which he must guard himself effectively or suffer the penalty, which too often comes in the shape of disease or death; but there is no one of these dangers which may not be overcome. In the wise old Arabian story, the magician sends the youth into the secret treasury, informing him first carefully of all the talismans which guard the jewels that he seeks; telling him also, that not only the obtaining of the object of his quest, but his own life, depends upon the annulling of the various talismans, and lastly impressing most carefully upon him the fact, that they are only to be annulled by a strict obedience to the laws of each. So the dangers which encompass us are to be met and vanquished; each one has its own law, strict obedience to which constitutes the charm by which we are to escape; if we fail in rendering this obedience, we are cast out sorely beaten, if not dead.

Let us see, then, what are the conditions of escape for us from the dangers, by no means imaginary, attendant upon this influx of *air from subterranean* regions into our dwellings. No efforts of any one individual can suffice to keep the soil clean as it should be, perhaps no effort even of a community would be sufficient to that end; dismissing the idea as wholly impracticable, let us consider what each one can do for himself. It is a well-known fact, that in certain districts of the city of New York and of many other large cities, both of the Old and New World, where fever and ague was formerly a constant plague, it, with other kindred diseases, is now wholly unknown; what has brought about this change? Chiefly two things — drainage and paving; the one by removing the superfluous water from the soil, the other by providing an impervious covering for it. Here we have one clue to safety; if we cannot isolate the cellar from our dwellings, let us drain our cellars in the first place.

Says Dr. Reeve (in his article on Land Drainage in the report of this Board of 1878):

" It is probably entirely safe to conclude that more than one-half of all the cellars in Wisconsin are, at some season, or through the entire year, wet or damp, and consequently in need of thorough drainage." Our own observation leads us to think that this statement is by no means exaggerated. Here, then, is a matter entirely within the hands of the individual, a means by which we can prevent much dampness and its concomitant evils in our dwellings. Nor is the second expedient of less importance; every cellar floor should be paved, preferably with some one of the many impervious cements, now to be readily obtained, asphaltum, artificial stone, concrete, etc., etc., or in default of anything better, floored with planks, which may be rendered tight by means of tongues and grooves, and treated previous to being laid with coal tar on the under side, or with two or more good coats of boiled oil on both sides. It seems almost needless to add that planks for this purpose should be thoroughly well seasoned before receiving any treatment such as that described. With a cellar thus drained and paved, the foundation walls surrounding it properly constructed, with what Mr. Eassie calls a dry area, for the purpose of preventing absorption of moisture from the surrounding soil, we may rest secure from any fear of disease-germs or foul air obtaining access to our dwellings by that route, to any great extent.

But all is not yet done; having excluded damp and foul air, we must provide for the admission of that which is comparatively dry and pure; adequate ventilation must be secured. To this end the usual paltry cellar windows are entirely insufficient, for the reason that they are almost certain to be tightly closed at the very season of the year when ventilation is most demanded. Let a proper air-duct be laid from the outer air into the cellar, made of some impervious material, such as glazed stoneware pipe, of sufficient area, both ends being properly protected against the intrusion of rats, skunks and other vermin, furnished, if desired, with a register of simple construction at the inner extremity, while the outer end is located in some situation where danger from the entrance of sewer gas need not be feared, and the saving in doctors' bills, to say nothing of the increase in comfort and the greater fitness of the cellar for all its legitimate purposes, will amply recompense the outlay, which need not be very large in the first instance.

And just here may be said a word which has a bearing, though an indirect one, upon our subject. We have said, and too much emphasis can hardly be given to this point, introduce pure air; but how are we to be assured that air *is* pure? Many architects, and many enthusiastic advocates of pure air have indorsed their action, for the sake of insuring purity have carried up ventilating ducts to a considerable height, under the impression that air taken from the level of the roof must of necessity be purer than air taken from a lower level. Experiment carefully conducted has shown that this is by no means always the case. In sparsely inhabited localities there is no appreciable difference between air taken ten feet above the ground, and air taken from a much greater elevation; it will, of course, be understood that we leave all questions of malaria out of consideration. In densely populated districts the air at the surface of the earth is contaminated by all the causes to which reference has been made, while air at the level of the house tops is contaminated by all the gases poured from the chimneys and ventilating outlets, so that the purest and most suitable air for introduction into a cellar or any other part of a building, in such a district, will be found between the heights of six and forty feet.

Above the latter elevation lies a stratum of exceedingly foul air of a very considerable thickness; "the most impure air lies at from seventy to ninety feet from the ground, with a gradation rising to balloon heights. Upon a still day a tower would manifestly offer but little advantage in its elevation of the point of taking the air as regards its purity, unless its height were over one hundred, and perhaps two hundred, feet or more."*

It thus becomes obvious that all that is needful to secure the purest attainable air, is to give the external opening of the cold air-duct such an elevation as will secure it against the entrance of the ground exhalations, and against the danger of being tampered with by mischievously disposed persons, and that both these objects will be accomplished, under ordinary circumstances, by placing it at the height of eight or ten feet. If, therefore, we provide an air trunk made of proper material, of sufficient sectional area, and fitted with valves to adjust it to the varying conditions of wind and weather, we shall have done all that is needful for health. The same rule will of course apply to any fresh air trunk whatever.

All other precautions will, however, be useless if the cellar itself be left, as many cellars are left, wholly without care from one year's end to the other. Many a case of typhoid fever, diphtheria and kindred disease has been aggravated, and what might have been a mild attack easily manageable by ordinary treatment, changed to one proving fatal, by the foul air generated in the cellar, where lie decaying and decayed vegetables, where moisture drips from the walls, and fungoid growths adorn the beams above. Air from the cellar constantly tends to pass into the upper rooms of the house, and this tendency is greatly increased in winter. Keep, then, your cellars clean, dry and well ventilated, and you will have taken a very long step in the direction of right living.†

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* Report on the ventilation of the House of Representatives at Washington.—R. BRIGGS.

† We here transfer the following suggestion from Dr. Reeve's paper on Drainage. It gives a thoroughly practicable means by which cellar air may be kept out of the upper rooms: "The heat from the kitchen fire may be made to serve a most useful purpose in the removal and destruction of foul gases. The chimneys of all dwelling houses should be large, and built from the cellar bottom, and should be so constructed that a part of their area shall be separated from the remainder by a thin partition. The warmth from the chimney proper will suffice to create a strong upward current in the supplementary flue thus formed, which will carry the poisonous vapors far above the dwelling. Where chimneys are already built, not reaching to the cellar bottom, an imperfect substitute for the arrangement described is to conduct a stovepipe from the cellar into the chimney, leaving the bottom open."

Look to it that the air which forces its way into the upper chambers be not air contaminated with all the foul gases contained in the soil — that you are not breathing-in the odors from the privy vault and cesspool. It may not be amiss, in closing, to call attention to the experiments of Forster, in Munich, upon the admission of air through the soil.

A building was selected and prepared for the purpose by a thorough preliminary ventilation, after which the amount of carbonic acid present in the air within it was accurately determined. The building was then closed and sealed against the entrance of air by the usual channel, for several hours, at the expiration of which time the determination was repeated and the amount of the gas found to have increased materially. At both times a determination of carbonic acid in the outer air was made, for purposes of comparison. The conclusion to which Forster came was: "That streams of air are constantly forcing themselves into our living-rooms from the ground upon which our houses are built; we are constantly and directly in communication with the ground beneath our feet through the medium of the air we breathe."

From which we may reasonably conclude that some of the fairest homes of the earth are rendered unsafe for the habitation of man, by reason of a subtle diffusive poison which lurks unseen in the ground air, but which needs only proper attention for its removal, and that any place, however healthful, beautiful or grand, may be rendered unfit for human occupancy by man's neglect to prevent the evils engendered by his own presence.

THE ADULTERATION OF FOODS.

BY PROF. T. C. CHAMBERLIN, OF BELOIT,
STATE GEOLOGIST.

NOTE.—I desire to make unreserved acknowledgment of my indebtedness to my assistant, Mr. I. M. Buell, who has performed the larger part of the actual labor involved in the preparation of this report. Without such aid it would have been impossible for me, under the pressure of other duties, to have prepared it. I am also under obligations to Drs. Griffin, Reeve and Strong, of the State Board of Health, for works and fugitive articles on the subject.— T. C. C.

While there are wide differences of opinion as to the precise nature and amount of the influence exerted by food upon bodily health and mental activity, it is conceded by all thoughtful persons that the subject is at least one of great importance. The selection of the kind of food and its culinary preparation are questions of much moment, but they do not fall under our consideration. The impurities of food-material, due to careless or imperfect processes of manufacture, likewise deserve careful attention; but they are not strictly embraced within the limits of our subject, though they stand in close relationship to it, and incidentally receive some notice. The precise study before us is *the fraudulent adulteration of foods.*

We shall do well from the outset to distinguish two classes of adulterations, the first, in which the adulterant is a harmless substance — perhaps even possesses subordinate value — the second, in which it is positively injurious. In the first case, the adulteration is a fraud, but, beyond that, it does not injure. In the second instance, however, not only is the purchaser and consumer wronged, but his health, and, it may be, even his life, is endangered. The moral turpitude of this class of adulterations can scarcely be too severely condemned or punished. It is gratifying to believe, as the result of our investigations, that this species of adulteration is limited.

The gravity of the subject merits a far more extended series of examinations, and a much more elaborate presentation, than it has been possible for us to give, or the limits of this volume to permit.

The chief service, however, which any article can do, whether brief or elaborate, is to arouse attention and stimulate intelligent action. The evil is one which preëminently depends upon ignorance and indifference. A general knowledge of its nature and methods and an active vigilance against imposition are the best remedies that can be proposed. The history of the evil shows that these alone are sufficient to reduce it to very narrow limits, and, if aided by judicious legislation, to practically suppress it. But, however desirable it may be to incite attention and·action, the unwarrantable practice of exaggeration and sensational coloring of the evil will find no sanction in this report. Poisonous coloring matter in literature, or pseudo-science, is perhaps just as pernicious as poisonous coloring matter in foods and confections. It may be quite as injurious to live in constant apprehension of injurious adulterations as to occasionally partake of them. It is furthermore unjust to cast unnecessary and wholesale suspicion upon the manufacturers and dealers in food-stuffs, who, as a class, are doubtless not less upright and conscientious than their fellow citizens. It will be our simple endeavor to present the facts as we find them, to allay apprehension where it can be safely allayed, and to arouse attention where it seems to be demanded.

The samples were selected so as to represent, as far as practicable, all grades of the several articles. If it had been possible to greatly multiply the number and to draw from many markets, the results might carry greater conviction and would certainly be more satisfactory to us; but as they very closely agree with the hundreds, and even thousands, of tests made by experts elsewhere, there can be little doubt that they very fairly represent the average degree and character of adulteration as now practiced. In addition to our *own investigations*, we have drawn very fully and freely upon all reliable authorities within our reach. It has been thought best to give the easier and simpler methods of detection, and some explanatory matter, in the hope that others might be led to examine for themselves. Many of the tests can easily be made by any purchaser or housekeeper, and there are doubtless persons in every city competent to perform all, or nearly all, of the tests here given. Nothing would perhaps tend more to correct the evil than the prevalence of the practice of such examinations.

There are some facts connected with the history of the adulteration of foods, which, beside the interest they possess, have value as indicating the results of different methods of treating the evil, and therefore a brief historical sketch will be here introduced.

The adulteration of food in some form has probably been practiced as long as deception has been made to serve the greed of man. Its origin lies in an unlawful desire for gain, and the devices employed spring from an inordinate love of self rather than from ill-will toward those who are defrauded and injured. But, although the evil is as old as history, its special forms are incessantly changing. As soon as a given method of adulteration becomes generally known, it ceases to be profitable. Hence, as already remarked, the most effective way to meet and overcome the evil is to freely publish its methods before the world. Many of the enactments of former times have been based upon this principle, as we shall see.

The first important step taken in England toward the suppression of fraud in foods, was in the year 1202, when the "Assize of Bread" was established. Any baker whose loaves were found deficient in weight or quality, was condemned, for the first offense, to be drawn "upon a hurdle from the Guildhall to his own house, through the great streets where the most people are assembled, and through the great streets which are the most dirty, with the faulty loaf about his neck." For the second offense he was to be drawn "from the Guildhall through the great street of Chepe, in manner aforesaid, to the pillory, and to be put there at least one day." For the third offense, his oven was to be destroyed, and he was compelled to renounce his business forever. These penalties continued to be enforced until the time of Henry VI.

Similar punishments were also dealt out to butchers and vintners. One case is recorded in which a butcher, for selling measly pork, was paraded through the streets in disgrace, and the next day was set in the pillory with two pieces of his bacon hanging over his head. Another offender who was guilty of selling putrid meat was placed in the stocks, and the offensive carcasses were burned beneath him. The records of these times show twenty-three instances of like punishments awarded to dishonest butchers, thirteen to fraudulent bakers, and six for the misdemeanors of vintners and wine-drawers. These severe measures continued in force until the grosser offenses disappeared. As the nation advanced in intelligence and commercial activity, the laws gradually fell into disuse. The Assize of Bread, however, was continued with certain modifications until 1815.

But the change in the civilization and commercial relations of our ancestors did not eradicate the evil. The increased facilities for deception and fraud which were afforded by the multiplication of articles of consumption were readily seized upon, and the debasing of articles of food and drink was, perhaps, never so prevalent as at the beginning of the present century. About this time many articles of food, whose use had previously been restricted to the few, were coming into general use, and, even to the common people, the spices and fruits of the Indies were coming to be deemed daily necessities. The demand for cheap preparations, and the ignorance of the people as to what were the real characteristics of these newly-introduced articles, fostered a class of adulterations in which the general appearance of the article was preserved while its value was greatly lessened by the addition of worthless or injurious ingredients. Under these conditions, frauds were less noticeable, and the perpetrators were for a long time undisturbed in their evil practices.

The first active movement against these abuses began about sixty years ago, with the appearance of a treatise "On the Adulteration of Food and Culinary Poisons," by Mr. Accum, an expert chemist of that day. This work attracted much attention at the time of its appearance, and doubtless accomplished much *towards checking* the evil at the time by giving publicity to some of its forms, and by awakening consumers to the dangers to which they were exposed.

No special legislative action was taken, however, until forty years afterwards, when, after a parliamentary inquiry and a series of investigations, an act relating to the adulteration of food was passed. This law provided for the appointment of competent analysts, and affixed a penalty to the offense of selling articles known to be adulterated.

The executive clauses of this statute were, however, permissive, rather than mandatory, but few analysts were appointed, and great difficulty was found in securing convictions under its provisions, so that it soon became a dead letter.

In 1872, another and stronger act was passed, making the appointment of inspectors obligatory, and fixing the penalty for the manufacture of adulterations at a sum of fifty pounds and costs, for the first offense, and imprisonment, for the second. The penalty for selling the same with a guilty knowledge of the fact, was also fixed at a sum not exceeding twenty pounds, for the first offense, and for the second, the public advertisement of the offense and the offender, at the expense of the latter.

In Prussia, the laws are still more stringent, from the fact that the offender cannot shield himself under the plea of ignorance. The vendor of adulterated or spoiled goods is there liable to fine or imprisonment, together with confiscation of property, even though he be unacquainted with the nature and extent of the fraud. Similar enactments are also in force in France and Holland.

As the subject is only beginning to receive attention in the United States, it would seem that our nation has been unpardonably dilatory in its efforts to protect the health of its people.

During the past quarter of a century there appears to have been a marked decrease in the extent and banefulness of this evil. This result has been secured, not so much by the framing and execution of wise and stringent laws, as by the persistent and praiseworthy efforts of a few intrepid chemists and physicians who have been unceasing in their efforts to detect and expose every form and manifestation of the evil. Foremost in the ranks of these public benefactors may be mentioned the names of Hassall, Normandy, Marcet, Letheby, Gray, Thompson, Taylor, Gay, Fox and Phillips, of England; and Louberain, Garnier, Harel and Chevallier of the Continent. In our own country, we have witnessed as yet but the initiation of investigations, although several state and city boards of health have published reports upon the principal adulterations affecting the commodities of their respective sections. Among those who have written such reports are Dr. Sharples, of Boston, Dr. Squibb, of Brooklyn, Dr. Piper, of Chicago, Dr. Chandler, of New York, and others.

One of the most eminent authorities is Dr. Hassall, of London, who for more than a quarter of a century has given unceasing attention to the subject. His work, entitled "Adulterations Detected in Food and Medicine," published in 1858, and his more recent production, entitled "Food: Its Adulterations, and Methods for their Detection," are exceedingly valuable contributions to the subject. The latter volume contains 900 pages of closely printed matter, recording the results of the examination of many thousands of samples, and is illustrated by over 200 engravings, mainly of microscopical subjects.

COFFEE.

The so-called coffee "berries" are in reality the seeds of a tropical tree, or shrub, the *Coffea Arabica*, which is extensively cultivated in the Indias, in Asia and in South America. The interior of the seeds consists of an aggregation of angular cells, in the cavities of which globules of an aromatic, volatile oil are found, which gives to the coffee its characteristic fragrance. In the process of roasting, these cells are more or less destroyed and their contents liberated and disseminated throughout the mass, thus facilitating their separation in the after process of steeping. The value of coffee chiefly depends upon the presence of a peculiar organic compound, known as caffeine, which exists in the raw berry to the amount of about one per cent. This compound is not contained in any of the various substitutes or adulterants, and hence the failure of each and all of them to take the place of the genuine article.

Coffee contains no starch, and this fact affords a convenient means of distinguishing it from almost all of its adulterants, as *these are commonly* starch-bearing substances. To detect the presence of starch, make a boiled infusion of the suspected sample, and add a few drops of a dilute solution of iodine. If any starch is present, a blue color will be at once produced.

Pure ground coffee can also be distinguished by the oily nature and low specific gravity of its granules, which causes them to float for some time upon the surface of the water and to discolor the liquid very slowly, whereas most adulterants sink quite promptly, and soon discolor the water. These properties enable one to detect impurities, and at the same time to form a rough estimate of the amount of such adulterants. This test will give approximations only as the presence of chicory, etc., tends to "settle" the genuine coffee; indeed, a small quantity of chicory is often added to pure ground coffee for this very purpose.

The adulterations to be noted are mainly to be found in the ground coffees, the raw berries not being very easily counterfeited. It is said, however, that a machine has been invented for moulding artificial berries out of vegetable pulp, a deception after the order of wooden nutmegs and basswood hams. We have never heard of this product in the market, and it is rather to be regarded as a caricature of fraudulent ingenuity than as an actual production.

The list of adulterants that have been found in ground coffee is long and nauseating, though not especially dangerous. Roasted corn, beans, peas, chicory, carrots, parsnips, beet-root, dandelion, acorns, horse-chesnuts, mustard husks, coffee husks, spent coffee, burnt biscuit, burnt sugar, tan-bark saw dust and baked liver. This is, of course, an extreme list, and it is not to be presumed that all these are common adulterants. Indeed, among the samples examined by us, only two were found, viz.: browned peas and chicory.

Each of the eleven samples examined by us contained chicory, and seven of these also contained ground peas. An approximate quantitative test made with each of these samples gave 69, 59, 50, 35, 48 and 45 per cent. of adulterants, respectively, in the six samples of Rio coffee, and 44, 41, 37 and 18 per cent. of impurities in the samples sold as Javas.

Each of the adulterants discovered was plainly distinguishable by the unaided eye. The fragments of peas were recognized by their brown color, angular forms and brittle nature, and by the fragments of the seed coat which were frequently found adhering to them. Under the microscope, finely comminuted portions of this adulterant displayed the characteristic forms of the grains of pea starch. A few of the granules, when thrown upon water, soon sank and began to discolor the liquid, while a few minutes' boiling served to reduce them to a pulp, and the infusion gave a strong reaction for starch.

The fragments of chicory discovered in these samples were readily distinguished by their rounded contours, their softer nature — being easily impressed by the fingernail — and by their odor and taste, which resembles that of licorice. The granules of chicory quickly sink, when thrown upon water, and almost immediately begin to discolor the liquid.

It appears from our examinations that strictly pure ground coffee is not ordinarily to be found in the market. The common adulterants, however, are not in themselves injurious; they are frauds, but not poisons. This being so, the question may be safely left to consumers to decide whether they wish to drink pea and chicory extractive and call it coffee, and whether they are willing to pay the market rates for so-called Rio, which is more than half peas and chicory, or Java, which is 35 per cent., more or less, something else than coffee. If not, the remedy is simple — buy the berry, either green or browned. There is this further advantage, that the berries, even if browned, do not lose their strength as rapidly as the ground article. Many grocers keep the browned berries, and grind them for consumers when purchased. In this way, a pure article of ground coffee may be obtained. But the better practice is to purchase the berries, browned, if preferable, and grind as needed for use. The purity of the berries can then be determined by simple inspection.

TEA.

As was remarked concerning coffee, none of the various articles that have been substituted for tea possess its peculiar properties, nor are they in any true sense, equivalents for it. This is practically shown by the fact that, although the leaves of various other plants have been submitted to the public as substitutes, none of them has continued in use for any length of time. The peculiar qualities of tea are due to the presence of an alkaloid principal called *Theine*, chemically identical with Caffeine, but occurring in much greater proportions.

The tea plant, *Thea sinensis*, or *Camellia thea*, is a hardy evergreen flowering shrub, growing, when cultivated, from three to six feet high. It is apparently indigenous to Eastern Asia, and has been thence introduced into other parts of the world. The differences in color, fineness, flavor and strength of the various grades of tea depend, so far as known, almost entirely upon the age and condition of the leaves, the locality in which they were grown, the mode of preparation for the market, and the various substances added to increase the bulk or modify the properties of the article. The structure of the leaf is the same in all teas from China or Japan.

The adulterants introduced are of three classes, viz.: those which simply give additional weight, those which improve the color or lustre of the leaves, and those which restore the appearance and some of the qualities of old and exhausted leaves.

Adulterants of the first class are leaves of other plants, dust, sand, chalk, gypsum, oxide of iron and other mineral substances. Of materials used to improve the color and physical appearance of the article, iron sulphate (copperas), rose pink, logwood, black lead, soapstone, indigo and turmeric are mentioned for black teas, and Prussian blue, arsenite, carbonate and acetate of copper, chromate and bichromate of potash, and chromate of lead for green teas. For the restoration of exhausted leaves, in addition to the coloring matters mentioned above, catechu, an astringent extractive from the catechu tree, is said to be used, together with earthy material, wheat flour, gum and starch.

Of these adulterants the salts of copper and lead are to be considered as directly and dangerously poisonous, and therefore their use should be held, and if possible punished, as criminal. The iron sulphate, Prussian blue, chromate and bichromate of potash, catechu, gypsum, chalk, indigo, black lead and soapstone are in various degrees injurious and objectionable, while the rest, though scarcely harmful, have no good properties to mitigate their character as frauds. The adulteration of tea can therefore be looked upon with far less complacency than the comparatively harmless sophistications of coffee.

As most of these substances are insoluble in water, their presence, in any marked quantity, may be detected by the sediment. For this purpose, boil four or five ounces of the suspected sample; carefully remove the water and leaves, and examine the sediment with a magnifying glass or microscope. Grains of sand, iron oxide, logwood, Prussian blue, indigo and blacklead, if present, can frequently be observed with a simple lens. We obtained some very satisfactory results by applying chemical tests to the sediment under the microscope.

The presence of leaves of any other plant besides tea can be readily detected by their appearance after moistening or steeping. The marked and peculiar venation of the tea leaf, and its serrate outline, are not found in any of the leaves with which tea is liable to be adulterated. An examination of a few of the unrolled leaves will enable one to recognize the genuine leaf at a glance.

Twenty-five samples of the various kinds of tea procurable in our markets were examined by us with the following results:

A few foreign leaves were found in one or two cases. Their presence was possibly accidental. Many of the samples, however, were found to be artificially colored, and some of them were highly charged with coloring material. Prussian blue was found in samples of all grades of green and Japan teas, although very sparingly present in most samples of the latter. The highest grades of hyson and gunpowder teas contained apparently the greatest amount of coloring material, although a sample which was sold under the name of Japan dust exceeded all others in foreign matter, and furnished a thick, bluish sediment, which consisted largely of Prussian blue. Besides this adulterant, granules of a substance that was considered logwood were present in several samples, and yellow, waxy particles, resembling turmeric powder.

It is hardly probable that any large amounts of exhausted tea leaves are mingled with the teas in this country, since there is little reason to think that any considerable number of our people *who use tea* have arrived at that stage of moral degradation that would lead them to save or sell old tea leaves for the purposes of adulteration. Such practices, while they may exist, are, we think, of limited extent. There may be larger opportunities in the importing countries, but our examinations do not lead us to think that it is a very prevalent practice.

SUGAR.

This article deserves special consideration, not only from the important place which it holds in the domestic economy of all civilized peoples, but on account of the prevalent popular belief as to its impurities and adulterations. The quondam practice of "sanding sugar" has given us a type phrase for roguery in business, and the shadow of the obsolete evil still rests upon the article and its manipulators.

If "sanding the sugar" were the only debasement to which it is subject, we should be saved much critical study; but as a matter of fact, it is degraded mainly by the presence of inferior varieties of sugar, and hence arises the necessity for close discrimination between the several kinds. There are a score or more of closely allied compounds which are chemically classed as sugars. Only a few of these, however, are common or possess commercial interest. A brief statement of the leading characteristics by which these are discriminated from each other seems demanded by the plan and purposes of this article, but lest it may be found tedious or technical by those who desire only the *results* of examination, it is placed in smaller type and may be readily passed over.

Common cane sugar, or sucrose, is the variety which predominates in the sugar cane, beetroot and maple, whence the commercial supply is almost exclusively derived. It is also found in lesser quantities (and for the greater part mingled with other kinds) in many other plants. It is much more readily crystallizable than the associated sugars, and this furnishes a means of separation in manufacture, and of discrimination when adulterated. The crystals are six-sided rhombic prisms, while grape sugar, one of its adulterants, usually crystallizes in cubes or square tables. Cane sugar is very soluble in water, but nearly insoluble in pure alcohol, in which respect it differs from its common adulterants. When added to a boiling alkaline solution of potassic-cupric tartrate, it does not throw down a precipitate of copper oxide, while the kinds usually mingled with it do. Its solution produces right-handed rotation of a polarized ray of light, which distinguishes it from one of its common associates, *levulose*. It may be changed into two inferior kinds of sugar, *dextrose* and *levulose*, by boiling with dilute acids; but no method has yet been discovered by which the reverse change may be accomplished.

This disposition to change into the inferior sugar under the action of heat and acids, introduces one of the great difficulties of sugar manufacture, and one of the important sources of debasement. Acids, in addition to those already in the cane, are rapidly developed in the juice after it is expressed; and these, aided by the heat of boiling, soon convert a large portion of the cane sugar into the less valuable kinds, if not prevented. This is mainly done, so far as it can be done at all, by the use of lime to neutralize the acid, and by the employment of a low degree of heat in concentrating the juice.

It is not possible, however, to entirely prevent the change, and hence the concentrated juice contains the mixed sugars, and unless these are carefully separated afterwards, a debased product is the result. The inferior sugar thus formed — a mixture of *levulose* and *dextrose* — is commonly termed *inverted sugar*,* because a solution containing only cane sugar produces right-handed rotation of the polarized rays, while the new product reverses this and rotates the ray to the left. This is done by the predominating influence of the levulose, the dextrose, like cane sugar, tending to produce right-handed rotation.

Now, these inferior sugars differ in value, and as dextrose possesses less sweetness and is more to be apprehended as an adulterant, it becomes important to distinguish it from levulose, as well as both from the more valuable cane sugar.

Dextrose, as perhaps already sufficiently implied, receives its name from its right-handed rotary effect on the polarized ray. As it is familiarly found in raisins, it is also known as *grape sugar*. It is also called simply *glucose*, although levulose and some other sugars are also glucoses. It occurs naturally in the fruits and juices of many plants, commonly in association with other sugars. It is manufactured extensively from starch, or ligneous fibre, such as that of wood, linen or cotton. The variety thus produced is known as starch sugar, and has only about two-fifths of the sweetening power of cane sugar. The presence of this, therefore, either in cane sugar, or in syrups and molasses, is a fraudulent adulteration, inasmuch as it is not a natural product of the manufacture, and diminishes the saccharine qualities of the article. In addition to its inferiority, there is danger that the chemicals used in its manufacture — especially the sulphuric acid — may not be completely removed, and so remain as noxious impurities. This remark applies more particularly to the syrups.

Dextrose, whether natural or artificial, crystallizes less readily than cane sugar, and takes the form of cubes or square tables. These crystals are less soluble in water than cane sugar, but more so in alcohol. Its solution precipitates copper from a boiling solution of potassic-cupric tartrate, and becomes brown when treated with alkalies.

Levulose is closely allied to dextrose in properties, but differs from it most noticeably, in not crystallizing, in being sweeter, and in rotating the polarized ray strongly to the left, whence its name. It is nearly, or quite, as sweet as cane sugar, but as it does not crystallize, it can only become a part of commercial sugar by being absorbed as a liquid, giving rise to a moist sugar. If a sugar is dark or moist, there is good reason to suspect its abundant presence. It responds to the chemical tests above given in the same manner as dextrose, so that, while these tests distinguish cane sugar from dextrose and levulose, they do not distinguish these latter from each other. Practically, we have to deal with levulose, not in its pure state, but chiefly in the form of a mixture with dextrose, i. e., in the form of the inverted or fruit sugar previously mentioned.

A quantitative test for grape, or fruit sugar, may be prepared by combining

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* It is unfortunate for the clear and accurate discussion of the subject, that there is a difference of usage, as well as a redundance, in the employment of terms in naming the sugars, and something of confusion of expression, if not of thought, has been thereby introduced into the literature of the subject. We shall follow what seems to us the best *authorized usage.*

437.5 grains, or one ounce avordupois, of pure crystallized copper sulphate, three ounces of cream of tartar, 1½ ounces of pure potassic carbonate, 16 ounces of solution of caustic soda having a specific gravity of 1.12, with water sufficient to give the whole a measure of 12,630 water grains; 200 measured grains of this solution contain the quantity of copper which will be reduced by one grain of grape or fruit sugar in solution. To obtain the quantitative result, place the given quantity of water solution in a porcelain dish over the flame of a spirit lamp, and heat to a boiling point; make a liquid solution of the saccharine substance, of a given uniform strength; add this solution, drop by drop, to the boiling solution, until all the copper is precipitated. This is known by the disappearance of the blue color of the liquid and by the orange precipitate being no longer formed. The amount of grape or fruit sugar contained in this solution is in inverse proportion to the quantity required to affect this change. If it is also desired to obtain, by direct determination, the amount of cane sugar in the solution, another portion of it must be boiled for a few minutes with a drop or two of sulphuric acid, and then added as before to a measured portion of the test solution; the percentage of saccharine material now obtained, minus the former result, gives the relative quantity of cane sugar.

From the fact that the inverted sugar is an inevitable product of the manufacture of cane sugar, its presence does not necessarily indicate intentional adulteration, but rather imperfect separation. As sugar sells for much more than molasses or syrup, into which the inverted sugar would otherwise go, there is a temptation to leave as much of it, in the process of draining, as the grains of cane sugar will readily retain absorbed within their pores. If this is yielded to too far, it becomes evident from the dark and moist product. It is this latter result, doubtless, that gives rise to the popular suspicion that the sugar has been "watered." If there were no other debasement than simply the retention of some inverted sugar, it would be harmless from a sanitary point of view, and trivial as a vitiation. But imperfect processes of purification leave also other substances, as fragments and fibers of cane and nitrogenous matters; and these furnish the conditions for the development of fungus growths and the disgusting *acari*, or sugar mites. As these acari are "own cousins" to the itch mite, probably no one cares to make their personal acquaintance.

All observers agree in affirming that these parasites never infest the refined sugars, and the same is true of the fungus growths. For these reasons, some eminent authorities recommend the entire abandonment of the use of the lower or unrefined grades of sugar, and they seem to have almost disappeared from the market. The injunction does not apply to the better grades of brown sugar.

The list of adulterants, which have been found by different observers, includes artificial dextrose, or starch sugar, gum, starch, pulverized marble, sand, chalk, bone dust, salt and some other articles that are possibly accidental. As most of these substances are insoluble in water, their presence may be detected by dissolving a portion of the suspected sample in a glass. The impurities will manifest themselves in the settlings. If a sediment be found, chemical tests will determine its character, if it be mineral; while the nature of organic substances is best revealed by the microscope.

As to the prevalence, at the present time, of adulterations in the better grades of sugar, there seems to be but little difference of opinion among those whose testimony is based upon actual examinations. Prof. C. F. Chandler states, that although he has examined a great number and variety of samples procured at retail in New York, he has never found an adulterated or unwholesome specimen; and Dr. Hassall, after examining several hundred specimens, testifies to the fact that only four of them contained any impurities, except accidental ones, and these contained only starch.

Twenty-three samples of sugar were examined by us, in none of which was any inorganic or mineral impurity detected. These samples were all classed by the dealers as refined sugars, no other grades being kept in stock by any of the firms from whom we obtained samples. The several samples of white granulated and crushed sugars, tested by the solution previously mentioned, gave no reaction for inverted or grape sugar, and were essentially pure. A slightly moist yellowish sample gave 1¾ per cent. inverted sugar, and darker, moister grades gave 5, 6, 7 and 8 per cent., respectively, of the same product.

Polariscope tests of different samples of brown sugar indicated percentages of 94, 86, 84, 80 and 78, of cane sugar.

It is quite evident that this comparative freedom from adulteration has not always been prevalent, and that it is due more to the attention that has been directed to the subject than to any extraordinary honesty on the part of those who manufacture or deal in the article, and that it can be maintained only by continued intelligent *vigilance.*

MOLASSES AND SYRUPS.

In the manufacture of raw sugar, a large proportion of the concentrated liquid fails to crystallize, and is separated from the solid portions by drainage, and sold as molasses. In the process of sugar refining, still more of this uncrystallized product is removed, which forms the article known as syrup. The former product contains more organic and mineral impurities, and is therefore darker in color and ranker in taste than the product of the refining process; at the same time, it is generally richer in crystallizable sugar, owing to the ruder and more imperfect methods which are employed in effecting its separation. Syrup, on the other hand, from its comparative freedom from incidental impurities, its lighter color and milder taste, is generally preferred for culinary use, in spite of its inferior sweetening properties.

The essential ingredients of each of these articles are inverted sugar, cane sugar and water, and their value as sweetening agents depends upon the relative proportions of these ingredients; and this proportion varies greatly in the different grades found in the market. The more nearly complete the separation of the crystallized product in the process of sugar making, or refining, the poorer, of course, will be the quality of the molasses or syrup. The usual proportions of these three elements as given by C. F. Chandler are as follows:

	Cane sugar.	*Inverted sugar.*	*Water.*
West India molasses.........	47 per cent.	20 per cent.	27 per cent.
Sorghum syrup...............	45 per cent.	28 per cent.	22 per cent.
Refinery syrup...............	34 per cent.	28 per cent.	28 per cent.

We have already noticed that a sugar may be manufactured from starch, and that its value is much inferior to that of cane sugar. Although this artificial sugar is little used as a substitute or as an adulterant of the common sugar, there is reason to believe that, in the form of syrup, it is somewhat extensively employed in place of the product of the sugar cane. The difference between the sweetening power of these two articles is not so manifest, in this form, and the extreme variability in the amount of cane sugar actually present in unadulterated products favors the concealment of the fraud.

But the substitution of the less valuable article is not the only evil to be considered. Sulphuric acid is used in the process of manufacture, and this is not always completely removed, so that quite appreciable quantities of this free acid often remain in the solution. If this article is to be sold and used for culinary purposes at all, its true character should be known; and especial pains must be taken by the manufacturer to free it from sulphuric acid.

The results of partial analyses of syrups and molasses, made by us, are given below. They differ somewhat from those just quoted, the proportion of cane sugar being considerably lower, and the amount of water somewhat greater:

	Cane Sugar.	Inverted Sugar.	Water.
No. 1 molasses	18 per cent.	22 per cent.	29 per cent.
No. 2 do	20 do	21 do	27 do
No. 3 do	32 do	18 do	29 do
No. 4 syrup	25 do	25 do	28 do
No. 5 do	28½ do	34 do	25 do
No. 6 do	22 do	28 do	30 do
No. 7 do	18 do	23 do	37 do
No. 8 do	None.	31¼ starch su.	

Nos. 1 and 2 were identical in physical appearance, and were black, rank molasses of the cheapest grade, sometimes called "black strap."

No. 3 was of the best grade of molasses, somewhat ranker in taste, but differing little in color and consistency from the lower grades of syrup.

No. 4 was taken from a dark low grade of syrup, tasting less rank, and at the same time with less of sweetness than the preceding example.

No. 5, although containing the greatest total amount of saccharine matter, was a rather dark colored sample.

No. 6 represented a lighter grade of syrups, both as to color and saccharine properties.

No. 7 was from a thin light grade of syrup, probably watered.

No. 8 was evidently a sample of artificial starch syrup, and differed from the others in the absence of any crystalline grains and in its somewhat acid taste. The presence of sulphuric acid was also detected in the sample.

This class of articles demands careful attention from analysts, not only from the introduction of artificial syrup, but because they are residual products and contain so many of the impurities which are separated in the manufacture and refining of sugar. The low grade of molasses contains so much of organic and inorganic impurities, that its use is highly objectionable on sanitary grounds.

CONFECTIONERY.

Under this head is embraced a class of articles which, from their almost universal use and extreme liability to adulteration, deserve careful attention. The extent of manufacture of confectionery is indicated by the fact that it is carried on in every state in the Union, and that the number of persons engaged in the vocation is over eight thousand, while the value of the manufactured products exceeds fifteen millions of dollars annually; over a dollar's worth for each boy or girl of candy-eating age in the United States.

The market price of this product exhibits an astonishingly wide variation, even in kinds which differ but little in external appearance, the retail price of the ordinary kinds varying from twenty to seventy-five cents per pound. As the cost of refined sugar is seldom less than fifteen cents per pound, and that of flavoring extracts and coloring material is ordinarily much higher, it is hardly to be expected that the cheaper kinds of candies are pure.

The various adulterants that are to be met with may be divided into three groups: (1) those which are added to increase the bulk, (2) those added to give flavor, and (3) the various coloring agents.

Of adulterants of the first class, chalk, gypsum, potter's clay, flour and starch may be mentioned. Of this list, the first three may be set down as positively injurious, although not poisonous; the others are frauds, but harmless so far as their sanitary effects are concerned. They may even be beneficial when candy is too freely used. All of these substances being insoluble in water, will be found as a sediment on dissolving the confection in pure water. Starch may be distinguished by means of the microscope, or by the iodine solution. The kinds of starch are easily determined, with the aid of a good microscope, from the size and form of the granules. The presence of chalk, gypsum or clay may be determined by the usual chemical tests.

A large variety of substances are introduced into confectionery for the purpose of flavoring. The majority of these, when pure, are harmless. The chemically prepared flavoring extracts are liable to contaminations, but as these are but a fraction of the extract, and it is used in but very small quantities, the dangers from this source appear to be limited, in general, but care and vigilance on the part of manufacturers are needed to prevent exceptional and accidental contamination of a dangerous character. The oil of bitter almonds is used to a considerable extent for flavoring. It is not in itself dangerous, but in the process of its preparation, prussic acid, an extremely virulent poison, is produced, and unless this is scrupulously and completely removed, danger is incurred; for although very small quantities would ordinarily be present, it is liable to accidental concentration. It is safest to avoid all almond-flavored confectionery. It may be remarked that the common almond itself does not contain prussic acid, and may be safely used.

The coloring ingredients embrace substances that are more numerous and dangerous. Of the various pigments which have been, or are liable to be, used to color confectionery, the majority are injurious, if not poisonous, in their effects upon the human system. Among the coloring matters which are permissible may be mentioned saffron, tumeric, French and Persian berries, fustic wood, annatto, cochineal, carmine wood, madder, logwood, indigo, litmus, sap green and mixtures of yellow lake with indigo. Among the injurious or poisonous pigments may be noted gamboge, chromate of lead, sulphides of arsenic and antimony, red lead, vermilion, Venetian red, umber, Vandyke brown, Prussian blue, cobalt, acetate, arsenite, carbonates, oxychlorides and sulphates of copper, carbonate of lead, and bronze powders or alloys of copper and zinc. The use of aniline colors is not very objectionable, provided they are pure, but they are quite frequently contaminated with arsenic, and so practically they should be looked upon with suspicion. All the colors that are here considered harmless are vegetable, and are generally soluble in water. The prohibited colors, on the other hand, are almost all metallic compounds and insoluble in water. This fact is of great assistance in determining the character of the coloring material.

Some of the simpler methods by which the more common coloring agents are indicated may be enumerated, though more complete tests are necessary for positive determination in some cases. Vegetable or animal reds may be detected by simply immersing a portion of the colored candy in a solution of caustic potash, and another portion in acetic acid; if it be a vegetable color or cochineal, it will become purplish in the alkaline and bright red in the acid solution. Vegetable yellows may be determined by their turning brown when the confection is immersed in caustic potash. Of the vegetable blues, litmus may be easily determined by treating the colored article with weak acid, when it instantly becomes red. Indigo is distinguished by its being unchanged when treated with alkalies, by its subliming in dense violet vapors when heated, and by its forming a blue solution with concentrated sulphuric acid. Vegetable green is distinguished by its being bleached by acids and by chlorine.

The presence of a lead pigment is easily detect d by placing a drop of nitric acid upon the colored surface; if lead be present, the color is at once destroyed; afterwards a drop of solution of sulphuretted hydrogen applied to the spot will produce a color more or less black according to the amount of lead present. If chromate of lead is present, it is best to use hydrochloric instead of nitric acid. The detection of vermilion or bisulphide of mercury is more difficult. The suspected substances must be boiled an hour or so in aqua regia, a little pure water added, the mixture filtered and the filtrate evaporated nearly to dryness; a little water must again be added and a little liquor potassæ or iodide of potassium. The former reagent gives a yellow precipitate, and the latter either a yellow or a beautiful scarlet precipitate of biniodide of mercury.

Of the mineral blues, Prussian blue is immediately discharged by the caustic alkalies and by ignition, its iron being changed to an oxide. Cobalt, smalt and ultramarine are unchanged by heat, and are detected by the blue color of the ashes of the burned candy. A cheaper artificial ultramarine, composed of a double silicate of alumina and soda with sodium sulphide, is often employed as a coloring agent. This is distinguished, after being washed free from other substances, by evolving sulphuretted hydrogen on the application of hydrochloric acid.

The simple metallic greens are acetate of copper, arsenite of copper, or Scheele's green, and carbonate of copper. Copper acetate is easily detected by the addition of sulphuric acid. The characteristic odor of acetic acid is immediately given out. Scheele's green is detected by separating a portion of the coloring matter by washing, drying this residue, and heating it in an open tube in the flame of a spirit lamp. The arsenic sublimes and condenses on the cold sides of the tube, forming a white substance, which, if examined by the aid of a magnifier, will be found to consist of minute octahedral crystals of arsenious acid. Copper carbonate is best distinguished by testing the solution for copper with ammonia; if the metal is present the ammonia will assume a blue color.

The compound greens are formed by the mixture of blue and yellow pigments, as Prussian or Antwerp blue with chromate of lead. To detect these coloring reagents, apply potash or ammonia to the colored surface. If the green color is replaced by a yellow, the presence of Prussian or Antwerp blue may be assumed. If, on the application of a drop of hydrochloric acid, the green color becomes blue, the presence of chromate of lead is indicated.

The brown colors, if mineral, are to be distinguished by the iron that is contained in them. Burn the suspected confection, dissolve the ashes in hydrochloric acid and add ferrocyanide of potassium; a deep blue color reveals the presence of iron.

Purple colors are made from a mixture of blues and reds, generally Antwerp blue and cochineal. These colors must be tested for separately, by the processes noted above.

In the examinations made by us, the samples were selected so as to represent as many different kinds as possible. Of course the limited time at our disposal precluded an exhaustive inquiry in respect to each of the numerous varieties of candy, and it is very probable that in this, as in other subjects of our investigation, adulterants may occur whose presence has escaped our notice. Upwards of sixty samples, however, were subjected to more or less complete analysis.

Thirteen of these only were pure candies, *i. e.*, free from any foreign material except harmless coloring matters.

Forty-six contained starch in varying proportions.

Eight gave the reaction for carbonate of lime.

Five contained gypsum.

Of the coloring materials detected, cochineal was found to be the pigment used in producing the red and pink shades.

In six, the yellow chromate of lead was detected in varying quantities.

Two samples were colored with indigo.

Two samples of those judged to be most adulterated were tested quantitatively. In one fifty per cent., and in the other thirty-eight per cent. of foreign material was found.

The conclusions derived from these examinations are the following:

1. Those kinds of confectionery that have been worked or twisted by hand are most free from adulterations, at present.

2. Gum drops, almond drops, seed candies, and most of the fancy shapes generally are comparatively free from adulterations, other than starch and coloring agents. The nature of the latter are to be judged of by what has previously been said.

3. The presence of gypsum and chalk was detected only in the motto lozenges, and these were quite generally found to be weighted with these impurities.

As the public have not the means of discriminating in individual instances, we feel justified in warning against the use of motto lozenges and yellow candies generally, until these abuses are corrected.

Public suspicion has already been justly excited in regard to the green and blue candies, and they are rarely seen. A similar attitude towards all injurious coloring will soon correct the evil. The starch, as before indicated, is not to be regarded as injurious, however much of a fraud it may be.

VINEGAR.

The essential principle in this article is acetic acid, an organic compound which exists naturally in considerable quantity in certain plants, as *Sambucus niger*, or black elder, *Phœnix dactylifera*, or date tree, and in some species of the sumach. It is also generated by the fermentation of various vegetable and animal substances, especially from the juices of certain vegetables, as the apple, grape, currant, and sugar cane; also from vegetable infusions and organic substances, as malt, starch, saccharine solutions and alcohol.

Acetic acid is also obtained from wood by destructive distillation. In its most concentrated form it is extremely acrid, blistering the skin, but commercially it only appears in a much diluted form. The amount of this acid in vinegar seldom exceeds five per cent.

The principal adulterants of vinegar are water, sulphuric acid, and coloring substances, as burnt sugar. Corrosive sublimate is also sometimes added to diluted vinegar to impart tartness. The presence of one-tenth of one per cent. of sulphuric acid in vinegar is allowed in England, but this permission is unwise, because a good article will keep without such addition.

The amount of acid in the article should never fall below three and one-half per cent.

The use of corrosive sublimate is simply criminal, as it is a virulent poison. The employment of sulphuric acid, though far less dangerous, is to be condemned.

Two samples of vinegar only were examined by us; the first was an ordinary yellow vinegar, which gave 4.875 per cent. of acetic acid. No adulterants were found in this sample.

The second was called white vinegar, and was almost colorless. Its acid strength was about 4.5 per cent., but it was found to be adulterated with sulphuric acid.

GROUND SPICES.

No class of articles presents so large an opportunity for adulteration as this. The pungent character of the different spices allows a very large foreign admixture without very noticeably affecting their properties, and the high price of most of them, offers special temptation to the dealer to increase the bulk at the expense of the quality. Hence, we need not be surprised to find adulterations more marked and prevalent here than elsewhere.

MUSTARD.

This condiment is the product of a genus of plants belonging to the order Cruciferæ, and, unlike almost all of the other spice-producers, is a native of temperate zones.

The seeds of two species only of this genus are used in the genuine article, viz.: *Sinapis niger*, or black mustard, and *Sinapis alba*, or white mustard. The former has smooth pods and reddish or blackish brown seeds, and the latter has hairy pods and yellow seeds. The genuine ground mustard of commerce generally consists of an admixture of the seeds of both species ground together, and, as the black variety contains a volatile oil, which is a valuable ingredient not possessed by the other variety, while the white mustard contains a valuable acrid principle peculiar to itself, this admixture is rather an improvement than otherwise.

The adulterations practiced upon this article are extensive and deleterious. Flour, starch, rice and carbonate and sulphate of lime are used to increase the bulk and weight, while Cayenne pepper, ginger, tumeric, ochre and chromate of lead are employed to restore the diminished pungency and color. We have reason to believe that some, if not all, of these adulterants are present, with rare exceptions, in the article that is offered to consumers, both as a condiment and as a drug.

Ten samples were examined by us and nine of these were found *to be adulterated.*

These samples were procured from leading groceries and drug stores, and from other sources. There was a marked variation in color and external characteristics in the different samples, due to the different articles used in the adulteration and its concealment.

No. 1, a bright sulphur-yellow article, contained a large proportion of starch, as revealed by the microscope and iodine tests.

No. 2, a dull yellow specimen, gave strong reaction for starch, and its ash, dissolved in borax, gave a green bead, indicating chromate of lead.

No. 3, a grayish yellow mustard, contained a large proportion of starch, and abundant indications of iron oxide in the ashes.

No. 4, a bright yellow sample, likewise contained starch and iron oxide.

No. 5 was a dull yellow, and contained starch, gypsum, chromate of lead and iron oxide.

No. 6 contained starch and iron oxide.

No. 7, a finely powdered, yellow variety, contained starch, common salt and chromate of lead.

No. 8 was reddish yellow, and contained starch and chromate of lead.

No. 9 contained starch granules in abundance.

In all these samples starch was found, and its grains were generally distinguishable in the powder under the microscope.

No. 10 was found to be a strictly pure article of ground mustard.

CAYENNE PEPPER.

The plants which furnish this article belong to the genus *Capsicum*, a member of the night shade family, which also includes the tomato, ground cherry and potato plants. Three species of this genus afford the capsicum of commerce, the *C. annum*, *C. baccatum* and *C. frutescens*, the latter species affording the strongest and best flavored pepper. The first species is cultivated in the United States.

The adulterations to which Cayenne pepper is subject consist of ground rice, starch, tumeric, salt, mustard-husk, vermilion, Venetian red, brick-dusk, etc.

Four samples of this article were examined by us, two of which contained starch in large quantities. One of these contained also iron in the condition of yellow ochre, carbonate of lime and sand. The sample which gave no reaction for starch contained iron in considerable quantity.

BLACK PEPPER.

The pepper of commerce is produced by *Piper nigrum*, a shrubby plant, which flourishes in the East and West Indies. The berries grow in clusters of twenty to fifty grains on the ends of the branches, and change in process of ripening from green to red and finally to black. The bunches are picked when beginning to turn red, dried in the sun, shelled and separated from the stalks, when they are ready for market.

The value of the article depends much upon the time of gathering. If gathered too soon, the grains shrivel and are broken and pulverized in handling.

The adulterations which have been found in black pepper are linseed meal, mustard husk, wheat flour, pea flour, rice flour, pepper dust, gypsum, earthy matter and iron. Five samples of pepper examined by us, gave rather better results than found in the other examinations; only two of these contained starch in any considerable quantities. One sample contained an appreciable quantity of iron.

GINGER.

Unlike the foregoing examples of spices, which are seeds or fruits, ginger is prepared from the root, or rhizome, of a biennial plant, *Zinziber officinale*, which is cultivated in tropical Asia, Africa and America. The commercial product is of two kinds, white or "uncoated," *i. e.*, cleaned and peeled, roots, and black, or "coated," uncleaned roots. The internal structure of ginger is formed of woody fibre, starch granules, oil globules, cells containing coloring matter, and ducts. In the ground article these parts are so broken and commingled that they are recognized with difficulty, and the detection of adulterants is correspondingly troublesome.

The adulterations which have been found in this article are sago, tapioca and potato starch, wheat flour, ground rice, Cayenne pepper, mustard husks and tumeric powder.

Four samples obtained from different sources were examined by us, three of which were alike in external appearance and, as far as ascertained, in composition. These were brownish yellow in color, coarsely ground, and contained much woody fibre.

A very bulky ash was obtained from the calciming of each of these samples, equaling seven per cent. in one instance. This residue gave a strong reaction for carbonate of lime and for iron, while sand was found in considerable quantity in the insoluble residue. These samples were undoubtedly made from dark uncleaned ginger roots, which had been plentifully limed. It is uncertain whether the iron present was an accidental impurity or was introduced as a coloring agent. The fourth sample was a light yellow or straw colored, finely ground article, with comparatively little fibrous material. A microscopical examination revealed no other ingredients than those of the ginger root. The ash in this sample equaled five per cent., and consisted mainly of carbonates, giving but slight insoluble residue. This sample was evidently manufactured from the uncoated, cleaned roots, and is apparently pure.

These four spices were all that were selected for examination. But it is fair to infer that the rest of the class would be found in a similar wretched condition. It is quite evident that the subject demands a much more thorough and exhausted examination than it has been possible for us to give.

Unlike many of the preceding articles, the nature of ground spices is such that they can appear in the market with the name of the manufacturer attached to each package, and the remedy for adulteration lies in ascertaining who invariably prepare a pure article, and then patronize them and them only. A report discriminating between manufacturers could only fairly be made after very extended and careful investigation.

BAKING POWDERS AND BREAD PREPARATIONS.

The various organic and chemical agents which are used in the preparation of farinaceous food, hold an important place in culinary economy and demand special consideration. Their use is as old as history, and as widespread as civilization, and the demand for them is likely to continue to the end of time.

The primitive method of preparing this kind of food was to mix the coarse meal with water and perhaps a little salt. The first step in improvement was the introduction of leaven, or fermented and partially decomposed dough. The decomposition begun in the leaven spreads through the dough, attacking the sugar contained in the mass, and changing it to alcohol, thereby freeing carbonic acid gas, which "raises" the bread. The reaction is as follows: $C_6H_{12}O_6 = 2\,C_2H_6O + 2\,CO_2$.

If, however, the decomposition has proceeded too far in the leaven, another reaction is induced in the dough, by which sugar is simply changed to lactic acid, and the loaf, instead of being raised by the liberation of carbonic acid, is soured and spoiled. The difficulty experienced in keeping the leaven in the right condition for use, together with the uncertainty in its action, has lead to a general abandonment of this means of aerating bread, although the process is still employed in France, where, by care and precision in the apportionment of ingredients, conditions and time, a fine product is uniformly obtained.

By the use of yeast, alcoholic fermentation is much more readily and certainly induced, and for this reason it has largely supplanted the more ancient preparation. This is a microscopic fungus whose growth and development involves the consumption and destruction of the sugar of the dough and the production of new compounds, the most important of which are alcohol and carbonic acid, a result identical in its main features with the last, although accomplished through organic agency.

The process by which the gas is set free, and the consequent aeration accomplished, is necessarily slow and uncertain in both of these cases, and although well adapted for the manufacture of bread, quicker and more certain methods are required for the preparation of many kinds of farinaceous food.

For these latter purposes various chemical agents have long been used, and they have recently much increased in number and variety of application. In these preparations there are two ingredients, an alkaline carbonate and an acid, or an acid salt. The evolution of carbonic acid is produced by the reaction which takes place when these are brought in contact in the moist dough.

The alkaline salts that have been employed in these preparations are bicarbonates of soda and of potassa, and carbonate of ammonia; and the acid ingredients are lactic, tartaric, and hydrochloric acids, and cream of tartar (an acid potassic tartrate), alum and acid phosphate of lime. Of this list bicarbonate of soda seems to be the only alkaline salt commonly used, and the acid salts have generally supplanted the acids as accompanying reagents.

The preparations in common use belong, therefore, to the three classes — cream of tartar powders, alum powders and calcium phosphate powders. In most of these a certain amount of starch is also introduced for the purpose of delaying, in some manner, the reaction, and at the same time to reduce the cost of the article.

Cream of tartar and soda have long been in use, the two agents being introduced separately into the flour or dough, and subsequently brought in contract in the process of kneading. But the difficulty of hitting upon exactly the right proportions and of thoroughly mixing the reagents has led to the general use of the prepared article. By the reaction which takes place in the moistened flour when cream of tartar powders are used, the soda unites with the tartrate, making a sodium-potassium tartrate, or Rochelle salts, and carbonic acid is set free. The residual compound is a mild cathartic, but when introduced into the system in this way is held to be comparatively harmless.

The main obstacle to the use of this baking powder arises from the scarcity and high price of the tartrate, and its consequent liability to adulteration. Instances are mentioned on good authority, in which from fifty to seventy-five per cent of terra alba have been detected in this article. A sample of cream of tartar examined by us was found to contain starch and lime in large quantities, and about twenty-five per cent. of residue insoluble in the common acids.

The demand for a cheaper production has led to the general introduction of baking powders in which the acid reagent is sulphate of alumina and potassa or ammonia, *i. e.*, a potash or ammonia alum. In the use of alum powders, there are three residual products, aluminium oxide or hydrate, potassium or ammonium sulphate, and sodium sulphate. The former probably acts as a simple, inert substance.

Potassium sulphate acts as a purgative, but the quantity produced in the reaction, though 23 per cent. of the residual product, is not large compared with the entire weight of the loaf. The principal ingredient is sodium sulphate, or Glauber salt, a very harsh purgative with a bitter saline taste. The bitter taste that is often noticed in biscuit and other foods where alum powders are used, doubtless arises from this source. It is customary to use from three to four hundred grains of these powders to a quart of flour, or from one and a half to two per cent. of powder. Disregarding the starch ingredient, the sodium sulphate resulting from the reaction exceeds fifty per cent. of the residuum. On the supposition that the amount of starch equals fifty per cent. of the whole weight of the powder, the amount of sodium sulphate remaining in the food will equal about one-half of one per cent. of the whole.

The above is based on the presumption that the ingredients are accurately and thoroughly combined. Sometimes this is not the case, and imperfect combination results. Ignorance or carelessness must lie at the bottom of this fault, for the result is deleterious alike to purchaser and seller. The proper proportions of sodium bicarbonate and burnt alum are about half and half, or, more accurately, 504 parts of sodium bicarbonate to 517 parts of anhydrous alum. If alum is used in greater proportion, the excess seriously impairs the digestibility of the food, and produces digestive derangement; if in much less proportion, the product is yellow and alkaline from the excess of soda.

The resultant compounds in the use of these powders, even when pure, are purgative, and their continued use is of doubtful propriety. The continual introduction of these substances into the system, even when in quantites not exceeding one-half of one per cent. of the bread, may be expected to occasion digestive derangements, especially in weak constitutions.

In the third class of baking powders above mentioned, the use of an acid phosphate instead of sulphates and tartrates furnishes, as is claimed, a valuable and needed element to the food in the form of a phosphate of sodium and calcium. This residual product restores to the flour the original phosphates of the grain which were *removed in* the process of grinding and bolting. This form of baking powder has the indorsement of Dr. Liebig and others of high authority, and there seems to be no reason why it should not supplant the inferior and questionable mixtures now in use.

Four samples of alum powders were examined by us, in one of which was found a large excess of alum, while the others contained a preponderance of the basic soda. One of these latter samples contained gypsum in considerable quantity.

In two of the samples examined, the acid element was cream of tartar. The solution derived from each of these contained hydrochloric acid, indicating the presence of common salt, added either intentionally, or present in the soda ingredient. In one of the samples, sulphate of lime was also detected.

A single sample of phosphate powder, known as Horsford's bread preparation, was analyzed by us. This was found to be as represented — pure sodium bicarbonate and calcium phosphate.

A few samples of soda were also examined, to determine the relative purity of this article, as compared with preparations of which it forms a part. In these, sodium, carbonic acid and hydrochloric acid were found, the latter indicating the presence of a small proportion of common salt. A sample of Babbett's saleratus was also examined, and found to consist chiefly of bicarbonate of soda, although bearing the name of the potassium salt.

INSPECTION OF PUBLIC BUILDINGS.

1. INDUSTRIAL SCHOOL FOR BOYS.
2. OSHKOSH NORMAL SCHOOL.
3. WHITEWATER NORMAL SCHOOL.
4. PLATTEVILLE NORMAL SCHOOL.
5. RIVER FALLS NORMAL SCHOOL.

Gentlemen of the State Board of Health:

Your committee on the inspection of public buildings respectfully submits the following report:

JAMES BINTLIFF,
Chairman of Committee.

In the fourth report of the transactions of the "American Public Health Association," for the years 1874–75, is published a valuable paper, on the "Perils of the School Room," by A. N. Bell, M. D., of Brooklyn, New York, in which occur the following passages: "The importance of air space rests upon the absolute necessity of pure air for healthy respiration; but the limits of space vary from 300 to 4,000 cubic feet for each person — the smallest portion being the exaction for lodging house dormitories, and the largest for hospitals — making due allowance in all cases for space occupied by furniture. And no deviation should be made on account of *children,* whether in the family or a school room.

" Moreover, it should be observed that the mere space allowance should in no case detract from the absolute necessity of means for renewal, and the smaller the space so much the more certain should be this provision. If 300 cubic feet only be allowed, the air must be changed, at the least, every ten minutes. To neutralize the deleterious properties of respired air and to replenish it, every person requires 2,000 cubic feet of fresh air hourly, and with less provision than this, contamination is sure to follow. The poisonous effluvia which pervades the atmosphere of close and unventilated rooms is not only re-breathed, but it adheres to all the surroundings; it sticks to the walls and furniture, settles into the drinking cups, into the food utensils, food and drink, permeates the clothing, and attaches to the person. It creates a nidus, which is not only in itself poisonous, perpetually lessening the vital force of all who inhabit it, and predisposing to blood-poisons of every kind, but it also becomes a hot-bed for the planting and propagation of specific poisons, such as small-pox, scarlet fever, measles, whooping-cough, diphtheria, and the whole catalogue of epidemic diseases, and a fruitful source of scrofula and consumption.

" The consideration of each of these diseases in detail, and their relation to crowded and unventilated places, would comprehend a treatise on the predisposing causes of epidemics. It may be stated in general terms, however, that the specific poisons which perpetuate this class of diseases, are kept alive by the conditions common to school rooms, always exist somewhere, and the history of them all demonstrates alternations of repose and activity, of prevalence in one place and absence in another. But the specific morbid poisons, the *seed*, never die; they remain and live on from generation to generation, ever susceptible to enlivening influences, and liable to transmission from place to place, renewing strength by the way, again to become dormant and lie in ambush, awaiting the return of congenial conditions for renewed activity."

Entertaining the conviction that the most effective method of bringing a knowledge of these principles to the community at large was to awaken an increased interest in the importance which attaches to the health of the rising generation, in the minds of the educators of the state, your committee was induced to make an inspection of the State Normal School buildings, and those of the State Industrial School for Boys, at Waukesha, and by tests ascertain to what degree the arrangements for breathing space and ventilation, and other hygienic conditions, in each, comply with well established requirements of healthful life in such buildings.

The hope of securing to the people a more intimate knowledge of hygienic law is largely dependent upon a rigid observance of the rules of intelligent being in our institutions of learning, and in obtaining for the study of the principles of physiology and hygiene a more prominent place in the curriculum of all our schools. Until great advances are made in this direction, so that the construction of our public edifices shall be under the surveillance of an enlightened public sentiment, we shall continue to have erected all sorts of absurd and disease-breeding contrivances; and these buildings will stand as an evidence of how little we know of ourselves, and of the conditions of life in health.

Hitherto we have been exceedingly solicitous that our children should be well informed as to how the traditions of learning were preserved through the dark ages; but indifferent to the stolid ignorance they exhibited as to how their own bodies might be preserved in health and strength.

INDUSTRIAL SCHOOL FOR BOYS.

At the time of our visit this institution contained 432 boys, besides the officers, teachers, overseers and attendants necessary to conduct the executive department. This large aggregation of undisciplined youth is divided into nine families, which, independent of the attendants, gives 48 boys to a family.

Each family has a large, handsome, substantial cottage for its home. All the boys belonging to each family sleep in one bedroom. This room is 14 to 15 feet in height for a considerable space in the center of the room; but the roof projects into the room at the corners so as to considerably reduce the air space. On the floor the room is 30 by 35 feet in size; and probably 250 to 260 cubic feet of air space are secured for each boy. In this room are *placed 24 two* story single beds; which leave scarcely space for each boy to reach his bed. If no more than 30 to 36 boys had been received into each family, according to the intention of the trustees when these buildings were erected, each boy would then have had 350 to 420 cubic feet of air space. This would have been well; and, clearly, the trustees would have been justified in refusing to receive a single boy more than this number, leaving the responsibility for lack of accommodations to the legislature, where it belongs. Unless ventilation is ample, and can be commanded at will, the risks of danger from overcrowding are too great to be assumed.

The trustees have now nearly completed a double family building, which, when ready for occupation, will somewhat relieve the necessity for overcrowding which has existed for several years past.

In the floor of the bedrooms there is a warm air register, 14 by 18 inches in size, used during the evening for the purpose of taking the chill from the room. This register is closed at nine P. M., and there is no other provision for the admission of pure air during the night except the windows, of which there are four in each room, each three ten-inch lights in width; and, we were told that, when the boys go to bed, each upper sash of these windows is let down about two inches. If the means of ventilation worked promptly and efficiently, this ingress space would give about one-third the volume of air needed for vitalization and purification by such a number of persons as these bedrooms contain.

But as the ingress of air to a room is measured by the volume of the outflow where the apertures for each hold any near relation to each other in size, it is important to inquire what are the appliances for carrying off the polluted air. In the bed room which we specially examined, there was in an old chimney, not now used for its original purpose, and near the floor, a register, 10 by 12 inches in size, which was working at the rate of 4 feet per second. At some elevation there were two 6-inch stove pipe holes, left open; and, in the centre of the ceiling, there was a circular register 30 inches in diameter, which connected with a 16-inch pipe, that passes through the roof.

If all these apertures worked uniformly in carrying off foul air at the rate of 5 feet per second, they would take from this room less than 30,000 cubic feet of air per hour, whereas the minimum requirement for a room crowded as is any of these bedrooms, is 2,000 cubic feet per hour per person, or 96,000 cubic feet for the whole. But as no one of these flues is heated, except by the increased temperature of the air within the building, they will not be uniformly active for the purposes of ventilation; and, under certain conditions of the atmosphere, motion can scarcely be maintained in any of them. Under the most favorable circumstances, these appliances come far short of accomplishing the purposes for which they were designed; when there is little difference in temperature between the outer and inner air, and when the outer air is laden with moisture, they become utterly worthless. So any system of ventilation is worthless, and a snare, that cannot, at will, be made to work with the constancy, efficiency and uniformity required by the needs of man for pure air, regardless of any exterior conditions.

There are other rooms in these buildings, in a much worse condition, with reference to ventilation, than the bed rooms. In the school room of the family located in the building for discipline, a room 30 by 18 by 11 feet in size, there are no appliances for ventilation; and, we found congregated there, a teacher and forty pupils with doors and windows closed. In the school room of the senior department, where from twenty-five to forty-five pupils assemble for instruction, except a 7-inch stove-pipe hole, near the ceiling, there are no means for carrying off the constant accumulations of foul air. In the school room of the first intermediate department, where forty pupils assemble, and in that of the first primary department, there is no ventilation. In the primary school room where we found fifty-seven pupils, there were but two ventilating flues, each 8 by 10 inches in size, which, when they are operative, would carry away from each pupil less than two hundred and fifty cubic feet of air per hour. The tailor shop with ten boys; the knitting shop with forty boys; the shoe-shop with sixty boys, are each, with the exception of one 8 by 10 inch flue in one of the rooms, without ventilation. The assembly hall, in which all the boys and teachers assemble to hear lectures, sermons, or for other *general exercises*, has no ventilation. There are registers in the *ceiling of this room*, opening into the space between the ceiling and the roof, but there is no opening out of this space through the roof or otherwise.

It is thus evident that a large number of the rooms in these buildings have no ventilation: that where something has been attempted in that direction, the appliances have neither the capacity nor the means by which their operation can be uniformly secured, so as to meet the wants of the inmates of this institution. In other words, there is no ventilating system in a large portion of the institution; and, where there is a system, it is a bad one. The generally substantial and elegant appearance of these buildings are a credit to the trustees and to the state. The lack of ventilation is a deficiency to be supplied; for without it, neither the physical health, the discipline, nor the morals of the school, can be so good as they might be made if an abundance of pure air was furnished to each occupant. Let us bear in mind Dr. Bell's admonition, that where less than 2,000 cubic feet of pure air per hour is provided for each person, contamination is sure to follow.

An imperative demand of this institution is a thorough inspection; and based upon that inspection a plan for an effective system of ventilation, by a competent architect. But no plan should be adopted, unless such plan provides for removing from each building 2,000 cubic feet of air per hour for each person occupying it; as certainly when the furnaces for heating are not in operation as when they are.

THE WATER SUPPLY AND DRAINAGE.

In making a sanitary examination of this institution in other features than those relating to ventilation, it becomes evident that it is one which has grown to dimensions that are greatly beyond the conceptions of its original founders. As the numbers of its inmates have increased, making more room an absolute necessity, new buildings have been erected from time, to time but to the absence of any comprehensive plans providing for such unexpected growth may be attributed the fact that it has failed to secure many advantages which would have accrued had its present and future needs been foreseen and such plans been adopted when the institution was first founded.

The several buildings of the institution are in many respects favorably situated. Located upon ground that is nearly level, and elevated some fifteen or sixteen feet above the river, into which the sewage of the institution discharges, its main sewer has a fall of about eleven feet in a distance of forty rods; hence it would seem that its facilities for proper drainage are excellent, and there being no water closets, the waste of the institution does not consist of the material generally considered most dangerous and offensive. Nevertheless, the sewers themselves do not meet the requirements of the sanitary science of the present day in their construction, and should receive skillful and careful examination, with the view of ascertaining and correcting their defects. The main sewer is built of stone laid in lime and cement, and it is evident that in the time that has elapsed since its construction, it may have sustained such injuries as to permit of leakage into the soil at many points; that such defects in the sewerage may be attended with unusual danger, is evident when we consider the character of the soil on which the institution stands.

This may be described as an immense bed of coarse gravel, overlaid first by a thin stratum of clay and then by a somewhat thicker one of rich loam, both together not exceeding six or seven feet in depth. In such a soil it is obvious that any filth which percolates into the gravel stratum may contaminate the water supply which is obtained from that stratum, and is reached at almost any point on the premises at a distance of eleven or twelve feet from the surface. So pervious, indeed, is this gravel bed, that no large reservoir of water has ever been found needful for the wants of the institution, water flowing so freely through this stratum that it will fill an ordinary well with sufficient rapidity to supply a steam pump running steadily at moderate speed, or to refill the well in a few minutes should it become exhausted under an excessive demand.

From wells of this kind, of which there are ten upon the premises, the school is supplied with water. Five of these wells are under the buildings, and with one exception these are "driven" wells supplied with hand pumps. The remaining well, situated beneath the laundry, has hitherto furnished the chief supply of water used in the institution, a steam pump connected with it having been the means of distributing the water to the points where it was needed.

On the occasion of a recent outbreak of fever in the school, samples of water from all the wells upon the premises were subject to careful examination, in the office of the Secretary of this Board, with the object of determining their fitness for drinking and culinary purposes. This examination showed that the water from several of these wells was entirely unfit for such uses, while others were comparatively uncontaminated; and subsequent inquiry as to the location of the wells, showed that the waters taken from wells beneath the buildings had in every case been condemned, while those more favorably reported upon, were, with one exception, the most remote from the buildings and most favorably situated for escape from accidental contamination.

The waters from the wells which were adversely reported upon, have since been abandoned, and those which were reported to be free from contamination, now form the exclusive source of supply. One of the wells, the water from which was reported upon as pure, is found, however, to be in such dangerous proximity to the wash and bath room of the Correction House, that its freedom from contamination from that source can only be assured so long as the cemented floors and the plumbing remain entirely perfect.

It is evident, however, that in a soil of the character we have described, every form of filth that can penetrate to the gravel, will filter through it with perfect facility, and that it may reach even the most remotely situated of the wells. In this soil the abandonment of the old form of privy vaults, and the substitution therefor of the "dry earth system," was, therefore, a wise — indeed, an absolutely necessary, sanitary precaution. We learn that "this system was first introduced in this institution in 1871, by the use of one closet; after this, others were built, as occasion might require, when additional 'family buildings' were erected."

Two vaults, however, continued to be used until 1876, and one was not entirely abandoned until 1878, since which time the dry earth method, combined with frequent removal, has been in exclusive use. Though the system adopted has not yet attained perfection here, the officers of the school are nevertheless entitled to great praise for its early introduction, and for the final and entire abandonment of the old form of privy vault, and we commend their example in this respect to the officers of all public institutions not already favored with the water closet system.

It may not be amiss in passing to say that the efficiency of the "earth closet system" depends upon the care exercised in the use of clean, dry earth sufficient for the absorption of all liquid discharges, the value and inoffensiveness of the method being entirely dependent upon the abundance and dryness of the absorbing and oxidizing medium. To the extent of any neglect or failure in this particular, there will be perpetuated all of the evils of the old privy system, including filtration through the soil and consequent danger of contamination of the water supply.

A source of danger to the health of the inmates of the Industrial School lies in the fact that the sewage of a hotel of popular summer resort has been led by the contour of the ground beyond its own proper channel to a low spot of ground belonging to the institution, where it has frequently formed a cess pool of considerable size in the rear of, but in such proximity to the school buildings that the foul odors from it have often been carried into them. This condition of things existed, we were informed, at the time of the outbreak of fever in the school above referred to. To what extent it may have been a contributing cause of that outbreak is uncertain, but, in view of the well established fact that such forms of disease may be produced by similar causes, it is a manifest evil that should by no means be further tolerated.

The character of the soil renders filtration through it into the water supply of the institution, whether from this cess pool or from any other form of surface filth, a matter of such easy accomplishment, that extraordinary attention to the sanitary policing of all parts of the premises is constantly demanded. Such policing should include attention to the cleanliness of barns, stables and similar outbuildings, and the very frequent removal of all animal excremental deposits.

In view, however, of all the facts we have enumerated, we believe that the difficulty of securing such absolute cleanliness as is *essential to the* continued purity of the water supply of this institution so long as it is obtained from its present sources is, so great as to render it a matter of grave doubt and uncertainty whether such purity can long be maintained in any of its wells. We believe, therefore, that a radical change in the source of its water supply is urgently demanded, and that water should be procured from a source from which all probability of dangerous contamination is excluded. This change would, of course, involve the solution of a problem in engineering, but it is believed that a supply of water of undoubted purity, ample for all the present or future needs of the institution, may be obtained without difficulty and at a cost that will be wholly insignificant when compared with the advantages resulting therefrom.

THE NORMAL SCHOOL BUILDINGS.

The lack of accurate knowledge of sanitary science, and the still greater lack of an appreciation of the importance of such knowledge, in all our institutions of learnings, are notorious. Hon. Andrew White, late president of Cornell University, writing on this subject, says: "I can speak of this want of knowledge from personal experience. I can stand in the confessional on this subject." By forcible reasons drawn from the nature and relations of sanitary science to the general welfare, and by illustrations almost startling in their power, drawn from his experience in public life, President White enforces the propositions "that provision should be made for instruction in Human Physiology, Hygiene and Sanitary Science, in all departments of public instruction; in our public schools, by providing fundamental instruction, especially in the simple principles of physiology and hygiene; in colleges and universities, by presenting this general instruction in a more extended way, and by promoting investigation; in medical colleges, by giving more special instruction in matters relating to public and international hygiene; and that, in our departments of engineering and polytechnic and technological schools, especial provision should be made for instruction in sanitary engineering."

When these principles shall have been adopted; when to acquire a knowledge of himself, and of the best means to adapt his powers to the complex demands which modern life are making upon man, shall have become the first object of education, the school buildings we shall then erect will be the exponents of a different class of ideas from those out of which the school buildings of the last fifty years have been evolved. Architectural display will be abandoned as incongruous and foolishly expensive. Lofty structures, the upper portions of which cost more to occupy than they are worth, besides not being well adapted to any educational purpose, will not be thought of. Only one and two story buildings will be erected, each part being planned with specific reference to its purpose, to ventilation, light, acoustic properties and ease of passage from one part of the building to another.

Of the educational authorities in our state, none are more progressive in these directions than are the members of the board of regents of the state normal schools, and the presidents of each of these institutions. In fact, the directors of the normal work throughout the country seem to us more receptive than others of the changes which society, as it is being reorganized into larger masses, by the railroad and telegraph, is demanding in our educational system.

The following tabulated measurements of the volume of air passing through each of several rooms, in the

OSHKOSH NORMAL SCHOOL BUILDING,

will show the degree of efficiency which the ventilating apparatus in that structure reaches under the most favorable circumstances:

OSHKOSH NORMAL SCHOOL BUILDING.

Measurements of the volume of air passing through several rooms therein, with some results.

DESIGNATION OF ROOM.	No. of cubic feet of air in room.	No. of occupants	No. of seats.	No. of ventilating regr's.	Size of each, ⅓ to be deducted for scroll.	Rate of motion of air through registers.	Time required to change air in room.	No. cub. ft. air per hr. for each occupant.	No. cu. ft. of air pr. hr. for each, were seats filled.
Intermediate	16,800	34	48	2	16 by 24 inch.	2½ and 3 ft. pr sec.	30 min.	754	691
Intermediate recitation — Motion of the air so slow as to be scarcely perceptible with an anemometer.									
Primary class — Motion of the air so slow as to be scarcely perceptible with an anemometer.									
Grammar dept......	31,304	85	100	2	16 by 16 inch.	3 and 6 ft. per sec.	49 min.	451	383
Normal assembly...	57,750	195	200	4	18 by 24 inch.	Aver. 3 ft. per sec.	26 min.	664	648
Grammar and comp.	7,840	40	50	1	10 by 14 inch.	2 feet per sec	100 min.	117	93
Geography	8,820	40	......	1	16 by 16 inch.	7 feet per sec.....	20 min.	643	....

Persons familiar with the principles of ventilation will readily comprehend the significance of the foregoing table. Here is a magnificent structure in which devoted men and women labor to prepare teachers for the work of instruction, and in no one room in the building in which tests were made is there removed from each person occupying such room one-half the volume of air below which Dr. Bell says contamination is sure to follow. When the original building was erected, all the ventilating shafts were placed on the outside of the building; and it requires much more heat to maintain adequate motion of the air in shafts so located than if they were on interior walls.

But the primal difficulty is that the exhaust shafts are not sufficiently large. In the first place a large smoke pipe runs through the centre of each, occupying no inconsiderable space; and, when the remaining space is divided between the three stories, with registers into it in each, the motion of the air from each room is necessarily too slow to carry off the volume of air required to be removed to secure the healthful occupancy of any building. Moreover, buildings of this character should be supplied with appliances with which to work the ventilating apparatus to its full capacity, whether the furnaces are needed for heating or not.

The foregoing tests were made after the winter weather had commenced. If tests should be made when little fire is needed in the furnaces and the temperature of the atmosphere was still too low to open windows, a much worse condition of the ventilating process would be apparent. There is this fact, however, to be borne in mind with reference to each of these Normal school buildings, namely, a large number of the students are twice estimated; once in the assembly halls, and once in the class or recitation room. Still, each room should be so constructed as to give the requisite volume of air to maintain life at its full vigor, even though the student remains in it but an hour.

The third story of this building was almost without ventilation; but since our visit, the regents have renovated and improved these rooms, admitting more light, into them, and making some provision for additional ventilation.

The following table shows the condition of the ventilation in the Whitewater Normal School:

WHITEWATER NORMAL SCHOOL BUILDING.

Measurements of the volume of air passing through several rooms therein, with some results.

DESCRIPTION OF ROOM.	No. cubic feet of air in room.	No. of occupants	No. of seats.	No. of ventilating reg'rs.	Size of each, one-third to be deducted for scroll	Rate of motion of air through registers.	Time required to change air in room.	No. cubic ft. of air per hr. for each occupant.	No. cu. ft. of air pr. hr. for each, were seats filled.
Intermediate dept.[1]	....	.....	.....	.....	....	....	....	....	....
Recitation, int. dep	6,240	12	20	1	14 by 20 inches	5 feet per second	16 minutes	1,945	1,167
Primary..	7,488	24	60	1	16 by 24 inches	5 feet per second	14 minutes	1,332	533
Normal recitation.	7,488	30	60	1	16 by 24 inches	5 feet per second	14 minutes	1,066	533
Grammar	18,720	76	76	1	20 by 30 inches	5 feet per second	22 minutes	657	657
Preparatory reci'n.	6,240	25	30	1	12 by 20 inches	1½ ft. per second	62 minutes	240	200
Normal rec. No. 13	8,100	30	45	1	14 by 20 inches	6 feet per second	17 minutes	936	624
Rec., Sci'ntific dep.	18,000	25	50	1	26 by 20 inches	6 feet per second	20 minutes	2,082	1,041
Penm'nship and D.	48,000	45	70	2	12 by 14 in. ea.	7 & 10½ ft. pr sec.	62 minutes	1,083	664
Normal assembly.	54,000	200	220	4	16 by 24 in. ea.	6 & 7 feet per sec.	19½ min.	831	735
Grammar recita'n.	9,828	30	30	1	16 by 20 inches	5 feet per second	22 minutes	890	890

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[1] Ventilating shaft inactive.

One purpose in preparing these tables was to bring within the comprehension of the popular mind the fact that, with proper instruments carefully used, there is no more difficulty in establishing the volume of air that passes through any room than in measuring the contents of a crib of corn.

The Whitewater building, located on an eminence, has a commanding appearance, and is favorably situated for the purposes of ventilation. The furnaces used are the pot furnace, which is unfit for heating; and the arrangements for conveying the warm air into the rooms above, are crude and wasteful. The basement frequently becomes so heated that the janitor is obliged to open doors and windows to permit the surplus heat to escape, while the halls above are cold. These halls should be warmed; and one or two registers connecting them with the basement, would accomplish the purpose. Warming these halls would be true economy; and, when the two furnaces in the basement are operated, which have no cold air connection, this desirable result can be attained without difficulty. Before long, however, all the heating apparatus in this building must, of necessity, be replaced.

When that time arises, we trust that the regents will avail themselves of the opportunity to increase the number and capacity of the exhaust shafts in the building, up to the sanitary standard; basing the calculation upon a medium rate of speed in the exhaust current, and upon the full number of students the building will accommodate, at 2,000 cubic feet per hour each, and with the additional means of operating the ventilating apparatus whenever de sired, and, independently of the furnaces when the temperature of the atmosphere made it necessary to dispense with furnace heat.

A building so ventilated would be a means of education to everybody who entered it. The difference in the condition of the atmosphere in such a building from that in all others would be perceptible to the dullest sensibilities, and constant inquiry would result.

One of the privy vaults at the institution is so arranged that the deposits can be removed. This is done two or three times in the course of the year. The other has a deep pit dug in the hill, which has not been emptied since it was first made. This hill is composed of drift, and, in process of time, this vault will contaminate all that portion of the hill near it, and become a serious cause of offense. This vault will eventually become a nuisance of no ordinary magnitude. The authorities of the school at Platteville have had some experience in this direction which they will be not likely to repeat. The best regulation of privy vault in any educational institutions we know of, in the state, are at Oshkosh and River Falls, where dry earth, ashes and saw dust are used, and the deposits removed daily.

PLATTEVILLE NORMAL SCHOOL.

The following table, exhibiting results of measurements made in several rooms, sufficiently indicate the efficiency of inprovements lately made in one part of the building.

PLATTEVILLE NORMAL SCHOOL BUILDING.

Measurements of the volume of air passing through several rooms therein, with results.

DESCRIPTION OF ROOM.	No. cubic feet of air in room.	No. of occupants	No. of seats.	No. of ventilating reg'rs.	Size of each, one-third to be deducted for scroll	Rate of motion of air through registers.	Time required to change air in room.	No. cubic ft. of air per hr. for each occupant.	No. cu. ft. of air pr.hr. for each, were seats filled.
Normal Assembly.	25,920	120	150	2	inches 12×18 & 11×15	9 ft. & 10 ft. pr sec	24 minutes	540	432
Grammar Assem'ly	43,200	80	120	2	11×15 in. each	4 ft. per second	115 minutes	275	183
Intermediate......	13.160	35	40	1	150 inches, net	5 ft. per second	42 minutes	535	468
Primary..........	9,000	40	40	1	10×16 inches	5 ft. per second	36 minutes	375	375
Recitation No. 10.	A cold flue in outside wall with scarcely any motion of the air in it.								
No. 12.	3,780	24	24	1	12×12 inches	5 ft. per second	19 minutes	500	500
No. 13.	3,780	24	24	1	12×12 inches	10½ ft. per sec.	8 minutes	1,170	1,170
No. 15.	16,800	20	64	1	12×12 inches	9 ft. per second	41 minutes	1,215	379
No. 16.	7,560	20	50	1	12×18 inches	11 ft. per second	10 minutes	1,765	960
No. 17.	No ventilation except through a register in the floor connecting with No. 16.								

During the past year some of the old furnaces have been removed from the Platteville building, and two Ruttan furnaces have been erected in their stead. Two new exhaust shafts were built to ventilate the rooms warmed by these furnaces; but, as in nearly every case brought to our attention, these shafts are not sufficiently large to carry off the volume of air required to be removed for purification. In due time the other furnaces will be removed; and, doubtless, the experience already had will suggest that, before other other exhaust shafts be erected, calculations be made as to what they are expected to accomplish, and the means made to correspond with the ends sought to be attained.

A privy vault, which has not been emptied for many years, still remains near the building; and the authorities are inquiring what they shall do to be saved from such a nuisance.

RIVER FALLS NORMAL SCHOOL.

The better conditions of ventilation which the following table exhibits existing in this institution, are the result of study and experience. The lack of exhausting capacity needed to bring the ventilation nearer to the standard of sanitary excellence will doubtless be supplied as the necessity becomes apparent to the authorities. Probably when another exhaust shaft is added one more furnace will be needed also; but these additions would certainly give a character for healthfulness to this institution not enjoyed by any other, that we know of, west of the Alleghanies.

RIVER FALLS NORMAL SCHOOL BUILDING.

Measurements of the volume of air passing through several rooms therein, with some results.

DESIGNATION OF ROOM.	No. of cub f. of air in room.	No. of occupants	No. of seats.	No. of ventilating reg'rs.	Size of each (⅓ to be deducted for scroll).	Rate of motion of air through registers.	Time required to change air in room.	No. cub ft. air per hr. for each occupant.	No. cub. ft. air pr hr. for each, were seats filled.
Intermediate	13,524	48	......	1	14 by 21 inches.	5 feet per sec.	33 minutes.	510	....
Primary............	14,112	36	......	1	19 by 24 inches.	5 feet per sec.	22 minutes.	1,055	....
Room No. 1........	10,368	30	... ..	1	16 by 24 inches.	5 feet per sec.	19 minutes.	1,066	....
Reading	10,672	25	......	1	16 by 26 inches.	4 feet per sec.	23 minutes.	1,031	....
Nat. Science.........	14,490	20	......	1	16 by 24 inches.	4½ feet per sec.	30 minutes.	1,440	....
Normal	23,040	112	......	2	22 by 30 inches.	5½ feet per sec.	11 minutes.	1,080	....

The River Falls Normal Institute is the latest fruit of the wise foresight of the fathers of this state, in providing an endowment fund with which to prosecute the noble work of raising the standard of instruction in our common schools. This building ought to be the best of the four already constructed, and it is so. Each of the others has been enlarged; and thus the unity of design is lost. The adaptation of means to the accomplishment of results — the harmony of forces that are best marshaled — is always more potent in a building that has ideas for its foundation, and is the well rounded expression of those ideas, than if it has any patch-work about it. Not that we think this is the best that could have been done; or that another will ever be built like it. We don't. The different processes of evolution are never alike. Its ventilation, as will appear by a comparison of the tables, is uniformly the best of the four. It is not as good as it should be; but it is probably the best ventilated educational building in Wisconsin. What is needed to make this building a model of its kind, is one more ventilating shaft of equal capacity with those now in the building, and the means to work these shafts independently of the furnaces whenever required. As the building fills with students this addition to its ventilating capacity will become a necessity.

In no one of these buildings are the supply and exhaust flues placed in their relations to each other in obedience to any principles, except convenience or accident. They are close together or wide apart, as the size of the room will permit. Sometimes the supply register is at the teacher's end of the room, and sometimes at the other or at the side.

We suggest for consideration whether the acoustic properties of a room from any given point are not affected by the direction in which the atmosphere moves within it; whether the pleasure and healthfulness of sitting in a room are not affected by the fact of whether the currents of foul air, in passing to the register, are established in the aisles or in the space immediately surrounding the sitter. The sickly soldier instinctively and invariably marches on the outside of the column whenever he is permitted to do so; because, he finds better air there. Ought not the relation of all these forces, to the purposes of the school room, to be regarded in arranging for the construction and furnishing of such a room?

TYPHOID FEVER AT PORT WASHINGTON.

BY A. J. SCHWEICHLER, M. D.

[NOTE.—The following communication from Dr. A. J. Schweichler, late of Port Washington, has seemed to be of sufficient importance to justify a departure from our usual practice, and it is accordingly presented as a separate paper. It was written in answer to a request from the secretary for some particulars with regard to an outbreak of typhoid fever, reported by the clerk of the Local Health Board at Port Washington, who mentioned the fact that Dr. Schweichler had attended many of the patients, and probably had as much knowledge of all the facts in the case as any one individual could have.]

In answer to your request, I will say in the first place that I do not expect to communicate anything novel in regard to typhoid fever in general. The disease has been very thoroughly discussed in all its relations by many eminent men both in Europe and America. But believing it to be the duty of every medical man to give his own experience and observations, I send the following account of facts, not to settle any question, but to enable impartial readers to draw their own conclusions, as I have already drawn mine.

I have been practicing in this village since 1873. Port Washington lies on Lake Michigan, and for the most part in the valley of the Sauk river, which is but a small stream for the greater part of the year; in the spring, however, when the snows are melting, it swells to respectable dimensions, and its waters are then charged with a great amount of impurity, including large quantities of organic filth, derived from decaying vegetable and other matter along its banks, manure fields, and other similar sources. Up to *the spring of 1873*, this river flowed directly into Lake Michigan;

at that time the U. S. government, having decided to construct a harbor at this place, dug out a basin of six or seven acres in area in the course of the stream, which, for a period of several months thereafter, poured its waters into this basin, depositing therein all manner of foul detritus, rotten wood, decaying vegetables, slush and mud, so that the basin became a source of evil odors, which were emitted until the river was again permitted to flow into the lake.

Whether typhoid fever had prevailed to any extent in this vicinity before 1873, I am unable to say; but the very first case of sickness of any kind which came into my hands was a severe one of that disease, and it was the only one known in the neighborhood at that time. Every fall thereafter, however, up to the fall of '76, a certain number of typhoid cases appeared in this place with great regularity.

In the spring of 1877, the government decided to enlarge the harbor by adding to the branch then existing, another on the north of some six or seven acres in extent. The locality selected for this enlargement was a swamp lying to the east of the village and parallel with the lake, its greatest length being from north to south. This swamp had long been the receptacle for all the refuse of the gutters of the village, many of the buildings of which stand in close proximity to it, and was separated from Lake Michigan only by a low sand bar about one hundred and twenty feet in width; the mud was from four to six feet in depth, and was underlaid by a compact red clay, wholly impermeable by any liquid whatever: lying on the surface of the mud were masses of putrefying garbage, which gave off odors perceptible all over the village whenever the wind blew from the east.

In the fall of '77, about one-half of this swamp had been dug over by the dredging machines, and the mud dumped half a mile out into the lake. That same season showed an increase of typhoid fever, the cases numbering from thirty to thirty-six (the population numbering about 3,000), two or three cases proving fatal. During the spring and summer of '78, the remainder of the swamp was dug out, it being then in its worst condition, from a sanitary point of view. The weather was extremely hot and dry, and several cases of sunstroke occurred, besides other diseases resulting from heat and drouth. Many wells in the village ran dry, and those in which water remained became too much contaminated to be fit for drinking or culinary purposes, although many, through necessity, continued to use them. This was the condition of things in the fall of '78, when typhoid fever again appeared in many places.

A laborer employed on the dredging machines, boarding at the American House in this village, suffered from what was called persistent diarrhœa, for three weeks, his illness commencing on or about September 1, 1878; he called on me for advice and treatment about the end of that month, when I at once recognized the disease as typhoid fever. It may be remarked here that the disorder had previously broken out among the men employed upon the dredges; some severe cases occurring every fall among them, and at an early period in the history of the disease each year; one man contracted the malady here upon the dredges, and went home to Ahnapee, where he died in a few days, as long as two years and a half ago. Returning to the case in hand, however, a few days after I had prescribed for the man above referred to, a child, also living at the American, was taken with typhoid, and shortly afterward other members of the family and boarders in the house were prostrated, until no less than fourteen cases had occurred in this one building, the last case being discharged cured on January 2d, 1879.

During this time, from September, '78 to January, '79, several families living near the American House had been using water drawn from the well upon those premises, nearly all the wells in the vicinity having given out; almost every one of these families contracted typhoid fever, my own being among the number. My hired girl was attacked in December and went home to Saukville, four miles distant, where she infected her mother and elder brother, both of whom died after two or three weeks illness. Meanwhile, I myself had contracted the disease, and was compelled to resign the care of my patients to other physicians. In all, there were over seventy-five cases of typhoid fever, four of which proved fatal, by far the larger proportion of which were in this village, those occurring in the country round about being few in number and mild in type, as a rule.

It would seem clear that some local cause or causes must have been in operation to produce this epidemic, and I am inclined to think that several circumstances must be taken into account in order to a full explanation. First, then, we have the hot, dry weather extending over two successive summers, the second of which was a peculiarly oppressive season, had produced an unusual amount of sickness and had greatly lowered the general vigor of the people, thus rendering them more liable to the invasion of disease. A second result of this state of the weather was the diminution of the water supply, the water in all the wells being much reduced in quantity, any zymotic poison present in it becoming concentrated, was thereby enabled to act upon the system with increased power. Most of the wells in this village are dug down only to the clay above referred to, or a little below its surface, with the object of forming in it a water-tight receptacle. In the lower part of the village the gravel has a thickness of from 12 to 15 feet, never exceeding the latter, and there are few wells in the place that have a greater depth than 15 feet. Even the few which draw their supplies of water from the lower strata are contaminated by drainage from the gravel from which the shallower wells are wholly supplied, and the character of the water, even under the most favorable circumstances, may be easily imagined. At the time under consideration, impurity from the village gutters and from the swamp combined, perhaps, with noxious gases from the well-stirred-up swamp to render the water specially foul and unwholesome. Yet another effect of the hot weather may have been the lowering of the level of the ground water, and this, also, may have been a factor in the production of disease.

All the circumstances hitherto recounted, however, do not seem sufficient to account for the outbreak, for all may exist — indeed all have existed here and elsewhere without producing disease to anything like the same extent. All had their effects, doubtless, if not in actually producing disease in producing a general condition of lassitude and debility which invited its attacks. The final explosion was brought about by a cause not yet considered, *i. e.*, the digging out of the swamp over an area of six or seven acres and the stirring up of a vast mass of the worst kind of soil — a soil impregnated with filth and refuse of all kinds, which was turned up and exposed to the influence of sun and air, thus bringing the germs of disease with which it was loaded into the most favorable conditions for distribution by every breeze that sprang up, the lowered vitality of the people rendering them easy victims.

As the fever had invaded my own family, attacking first my wife, then the nurse and the hired girl successively, and finally myself, I may say that my own well was dry, and that we had been using water from the American House, where, as detailed above, typhoid had made its appearance three weeks before it was even suspected, and where, therefore, no precautions had been taken until it was too late for them to be of service.

[NOTE BY THE SECRETARY, S B. H.—There is a point specially worthy of notice to which some allusion has already been made, and it is a point of great significance in considering the spread of this disease. Among the first cases, if not the very first case, was that of the laborer employed on the dredge, and boarding at the American House; it will further be noted that the American became a focus of the malady, there being no less than fourteen cases which occurred in that one house, and also that the fever spread rapidly among those families whose wells became dry and *who were therefore compelled to draw water from the well at the hotel.* The first patient had suffered from what was called persistent diarrhœa for three weeks before he made application for medical advice, and had been boarding the while at the American: as soon as he was seen by a physician, his disease was pronounced typhoid fever, and proper directions given for its treatment; he was also directed to use sulphate of iron as a disinfectant for all excreta, and the same material was ordered to be applied to the privy at the hotel. Three weeks, however, had passed between the appearance of the disease and the giving of these directions by the doctor, an ample time for the percolation of the poison from the shallow vault of the privy into the well, which was only forty-five feet distant and in a sandy soil. Moreover, the disinfection of the vault, tardy as it was, was by no means thoroughly or regularly done; thus, taking into account the shallowness of the wells generally, the porous character of the overlying soil, etc., we can hardly escape the conclusion that the water from this particular well had become charged with the specific poison of typhoid fever, and was a powerful agent in the dissemination of that disease.]

At the date of June 1, '79, many were suffering from gastric disorders and symptoms resembling those developed in typhoid fever;

these, although mild in character, had, in my opinion, doubtless the same origin; they may be explained on the supposition that the typhoid poison yet existed either in the air, or what seems more probable, in the water, though it may be in a diluted form, rains having been heavy and frequent just before. I believe that we shall be plagued with typhoid and similar maladies as long as the northern branch of the harbor is allowed to be a receptacle for all the sewage of the village, and that their severity will be proportionate to the amount of rainfall.

As to the prevalence of other diseases, I observed during the last winter and spring a limited number of cases of measles and scarlet fever, both of which were mild in type. Sporadic cases of erysipelas make their appearance here every spring, corresponding in frequency generally with cases of pneumonia. During the hot weather of July and August there were many cases of cholera morbus and other forms of intestinal disturbance, both among children and adults, which were frequently refractory and difficult of management.

In regard to public hygiene, I will make one suggestion. On our local boards of health, as they are now usually constituted, there is no member possessed of a competent knowledge of sanitary matters; the boards are made up of three members, all usually good, sensible men in most respects, but rather ambiguously informed in regard to sanitary requirements. Now there is within my own personal knowledge, within a very short distance from here, a family, composed of a husband weak-minded and under guardianship, a wife wholly insane, and six or seven children, all small and all having before them the fearful prospective doom of imbecility or insanity. The improper manner in which this family lives, the filth by which it is surrounded, the immoral education which the children are receiving — all these cannot be described, and the effects of all stretch out far beyond the present time. Should the state require the appointment on every local health board of at least one man of sufficient sanitary education, something might be done toward the avoidance of enormities like these.

Our public school building would be satisfactory in most sanitary respects if the board of education had not seen fit to construct a new privy in the rear of the building, and only a few feet distant from it, from which evil odors must penetrate into the various rooms, while the soil around and under the school house must become saturated with excremental filth in a very short space of time. Neither can the school well escape poisoning, and I, for one, look for an abundant crop of typhoid fever and other similar diseases to spring in due time from the soil thus carefully prepared for their development. Competent sanitary authority might have been judiciously exercised here also.

EXTRACTS FROM COMMUNICATIONS

OF

SPECIAL CORRESPONDENTS.

[NOTE. —We present herewith extracts from the correspondence of this office at somewhat greater length than usual, yet regretting that we are not allowed to give still greater space to these communications. The correspondence of the year has been unusually full of interest and value, and our thanks are again sincerely tendered to its authors for the interest shown by them in our work.

Thanks are also due to many correspondents from whose letters no extracts have been made for publication, but who have furnished information which has been of material service to us.

As heretofore, for convenience sake, we have arranged the extracts alphabetically, by towns, etc. —*Secretary State Board of Health.*]

From *Ahnapee* we have the following report from Dr. G. R. Bartran: Diphtheria has prevailed west of here for nearly a year past, but during the summer it has been mild, and now has nearly subsided. There have been only four cases in town, and those were mild. Scarlatina has prevailed for over a year in the country surrounding us, the first cases occurring here in town during the last two weeks of May, '79. Last week six new cases came under my care, all mild, and all recovering without active treatment. The origin of all these can be readily traced to a hotel in which two fatal cases occurred in May. School has been in session three weeks and will furnish a ready means of spreading the disease unless we can succeed in keeping out pupils from infected houses. It would be better to close the school, if possible.

From *Benton* comes this information through Dr. H. T. Godfrey: For the past two years malarial diseases, *i. e.*, remittents and intermittents, have decidedly increased. I can perceive no reason for this notable increase other than the subsidence of the ground water, which has fallen so far within a couple of years as to make mines easily accessible which could not formerly be reached without heavy pumping. Consumption is much more prevalent than formerly; this is attributable in many instances to the absurd insufficiency of dress for the proper protection of the chest and feet, especially of females, and to the attendance of young people thus insufficiently protected at balls, dancing parties and crowded assemblies, generally in buildings where no attention is given to proper ventilation; they afterward ride home, perhaps a distance of five or ten miles, the thermometer being from 10 to 20 degrees below zero; much might be done to obviate this danger by holding such reunions in the afternoon.

We are now suffering from diphtheria in one school district; it originated in a small frame house standing on a very tenacious clay soil; the cellar beneath is not walled, is entirely devoid of drainage and ventilation, is very damp, and often contains stagnant water. The disease has spread through a great many families; some cases are decidedly malignant, and thus far we have to record three deaths. I fear that unless the disease should subside before the setting in of cold weather and the closing up of houses for the winter, it will prove very serious.

The reports sent to me have been carefully distributed, and have awakened a very healthy interest in sanitary measures among the people, which will in due time bring forth good fruit.

Boscobel reports through Dr. L. G. Armstrong as follows: Malarial diseases prevailed one year ago over this entire country in the shape of fever and ague, with scarcely a single case of true remittent bilious fever, and few cases of diarrhœa, dysentery or cholera morbus; never did ague come in shape that relapses were more frequent; this was the rule; unless medicine were taken on the 7th, 14th, 21st and 28th days, the *secondary periodicity* was tenacious and very difficult to get rid of, while the primary periodicity was easily managed. During last winter quite a number had relapses even in the coldest weather. In the early spring almost every one who had had ague in the preceding fall had a new attack requiring the same treatment. During the month of July the heat was so intense that a very general languor overcame the people, and bilious-remittent fevers were very common, running a number of days, not amenable to the usual treatment, and leaving the patients very much debilitated. This state of things continues now (August), and a very large percentage of the people are suffering with fever. Another difference is plainly noticeable from last year, *i. e.*, the frequent occurrence of cholera morbus, which did and does prevail very extensively. Diarrhœa and dysentery are also common; ague is the exception. Diphtheria has not prevailed, neither has measles; we have had a few cases of whooping cough, but no general epidemic. Our streets and alleys are pretty well cared for generally by the lot owners; the authorities occasionally have to see that the work is done. Privies and hog-pens are the two unabatable nuisances.

From *Burlington* Dr. M. T. Darling writes thus: This locality has been unusually healthy during the past year. There has been *a marked change* in the type of disease as compared with other years; last autumn showed almost no typhoid fever, and the winter and spring were characterized by an almost total absence of lung fevers; in their place, however, we had an unusual number of cases of rheumatism and erysipelas: in two houses twenty rods apart there were five cases of the latter — no predisposing cause discovered. We have had more intermittents than in any one season since 1872; no malignant diphtheria, though many cases of inflammatory sore throat, with tonsillar deposit, often called diphtheria. Whooping cough has prevailed to a considerable extent, and a few cases exist yet; only one death, however, has been attributed to it. We have had no scarlet fever during the year.

From *Cedarburg* we have this information from Dr. J. A. Russell: Some malarial trouble existed here during the summer, which I think might be accounted for by the dryness of the season, there being in this section many small marshes and sink-holes which became dry. One case of intermittent, I think, can be traced to the fact that a creek was allowed to run dry every Sunday, a mill above closing its gates so that the water ran out, leaving the mud and weeds on the creek bed exposed to the sun and air. The house in which the disease occurred is nearly new, and above the average in its sanitary arrangements, the ceilings being high, and the cellar dry and well ventilated; outbuildings and well were in good order, and the emanations from the creek were the only reason I could assign for the outbreak. It is true that neighbors living within twenty rods were not affected by any intermittent, but it is also true that the general health of all in that locality was below par. The general health of my district has been good during the past year; we have had no measles, scarlet fever or typhoid. During the winter there was some so-called diphtheria, but none, I think, of the genuine type. I have heard of no cases of sickness directly traceable to defects in our school buildings, though the ventilation might be improved in them, and they are overcrowded; the allowance of cubic space is only from 150 to 180 feet per capita.

From *Centreville* Dr. W. Quehl writes: Since my last report, there has been no malarial disease, no diphtheria, measles, or whooping cough, either here or in the surrounding country. For a number of years I have been especially anxious about the public school houses in my nearest neighborhood, and to the distance of six miles around, as well about the inner as the outer conditions. I can say that matters are considerably better now than they were about ten years ago. Your Board cannot be too watchful in this thing, nor can it caution or correct enough.

From *Colfax* we have the following from Dr. E. Monteith: The prevalent diseases here are bilious and remittent fevers, and lung troubles. During the latter part of July and August, in harvesting time, there was an unusual amount of cholera morbus, owing to the extreme heat; but I neither saw nor heard of any fatal cases. I have had two cases of diphtheria of malignant type, one proving fatal, and both clearly traceable to the use of bad water; in one instance the water came from the river, being hauled in barrels and allowed to stand till it was unfit for use; the other family used well water, but there was a pond about six rods from the well, the water from which (pond) leached into that of the well. Much of the sickness hereabouts is due to the use of bad water; people feel too poor to dig or drive wells, and use water from creeks, etc., instead. Our school house is too small for the number of scholars who attend it — fifty in all — the building being only 18 by 26 feet.

From *Dell* Dr. D. W. Adams sends this information: Scarlet fever prevailed to a considerable extent in several towns in this vicinity, from April to July. A noticeable fact in connection with the outbreak, was that out of fifty-eight cases occurring in four towns, five only appeared on high ground; all the rest were in valleys, where the soil is a black vegetable mould, frequently damp, and inclined to be marshy. During the preceding winter, rains and fogs had been unusually frequent, and I am inclined to think that some miasmatic influence was concerned in the production of the disease. The prevailing type of the malady last spring was pneumonic; there were only two fatal cases, to my knowledge. Our district is of a somewhat rough and hilly make-up; the uplands are dry, while the valleys have a tendency to become marshy, being thoroughly dry only in dry seasons or toward the end of August. In some seasons typhoid fever is developed. I am decidedly of opinion that a thorough system of drainage would give comparative, if not absolute, immunity from the diseases mentioned, which generally appear along the low lands and in the valleys.

From *Eagle* comes the following brief report by Dr. C. B. Bannister: We have had no epidemic disease in our town during the past year, and but two or three isolated cases of diphtheria. Besides these, there were three cases in one family with one death, the disease having been imported from Milwaukee by one of the boys who had spent a few weeks in that city in a quarter where the disorder had prevailed at the time. Our town is healthfully located, and I know of no specially unsanitary conditions.

From *East Troy* Dr. D. W. Rector sends the following full and valuable history of an outbreak of diphtheria occurring at that place: Our late visitation of diphtheria was hardly in the form of an *epidemic*, for in nearly every case we were able to trace it to actual contact or contagious cause. It has been severe, nearly fifty *cases of the real* disease proving fatal, and some of those that recovered were afflicted with troublesome sequelæ. The disease made its appearance first in the town of Troy, one mile west of the town line between Troy and East Troy, about one-fourth mile north of the village of Troy, and about fifty rods from and north of the mill pond; thence it visited other localities, but its course was decidedly erratic; its progress was not uniform and indiscriminate, and we were frequently able to prove the fact of communication by means of persons going and coming. There were a few cases in this town, but in every instance save one, and that a fatal case, we were able to *prove* its origin beyond a doubt. In the fatal case referred to I am unable to account for its origin but infer communication.

The malady seemed to expend most of its fury upon the village of Troy, hardly a family escaping without loss when it appeared, and some who survived the disease dying of its sequelæ. A great many cases of so called diphtheria, of course, are not included in my estimate of the death rate; were they included, the percentage of mortality would be trifling.

Now as to causes. I do not know why the village of Troy should be more liable to attacks from putrid forms of disease than this village; but experience proves it to be the fact. The inhabitants of the two places are people of about the same class, and are all, I may say, in comfortable circumstances. There may be some cause of contagion or for the propagation of putrid virus in cellars, wells, privy-vaults, or soil; but I attribute the outbreak mainly to the marsh and the adjacent mill-pond, which is shallow, but does not differ materially from others. Last summer during the hot weather some of the larger fish died in the Troy mill-pond, but not in numbers sufficient materially to affect the locality.

[At a later date Dr. Rector sent a communication, from which the following extracts are taken. The condition of the premises described suffices to explain the occurrence of disease in their neighborhood.]

Having been duly appointed medical advisor to the Board of Health of the town of East Troy, it became my duty in common with that of the members of the board to examine certain premises in search of local causes for the development of epidemic disease. Upon one place were found a tobacco shed and other outbuildings; the tobacco shed is a building about 20 by 35 feet on the ground, without any floor. It was used as a store-room, stable, pig-sty and hen-roost; it was in an extremely filthy condition, reeking with horrible odors from rotten tobacco, stale manure, and pig-sty filth, mingled with the stench from the hen-roost. From fifteen to twenty hogs were kept in the south half of this building, which animals, judging from their appearance, were on the verge of starvation; the east side of the pen was dry, but the west side, the ground being lower, had the appearance of a cesspool. The scaffolds, girths of the building and every other available place had been used by the fowls as perches, and were loaded with their accumulated droppings, which, with the decomposing tobacco in open boxes, combined to send up the most villainous smell that ever offended human nostrils. From this shed we proceeded to the horse stable, where we found another pig-sty like the first, "only a little more so." Here one poor brute lay covered with filth, mangled and half devoured by its companions, while a second, yet living, but unable to rise, lay in another corner waiting its turn to fill the stomachs of its starving brethren. This pen contained from six to ten hogs in the same famished condition as those first described, and without a dry spot to stand or lie upon. The stable was also in an extremely filthy condition; manure in large quantities lay on the ground all over the premises. In view of the above facts, the following measures were recommended as proper to be taken by the local health board: 1st. The removal of all the animals to better quarters and better fare. 2d. The removal of all manure in the buildings and about the premises to a sufficient distance from any dwelling house. 3d. The removal of all broken, loose and decaying lumber from the premises. 4th. The filling with clean dry earth of all low places from which the filth was removed, and ploughing or covering by other means with fresh earth the surface of the ground from which the manure was removed. 5th. Whitewashing with lime the inside of the buildings to a height of at least eight feet from the ground, and scattering copperas or other disinfectant freely around. 6th. The indictment of the occupant of the premises for cruelty to animals, and for the manner in which he fattens (?) pork as an outrage on the community, and as a public nuisance.*

From *Elroy* Dr. C. E. Booth writes thus: The use of contaminated water for drinking and culinary purposes, is the most prominent of disease-producing influences in this region. The greater part of the water used for these purposes is procured from springs, most of which lie at the bottom of ravines, or at the junction of high with low lands, where, unless mechanically protected, they must receive the wash and drainage from above them. My attention has been drawn to this matter by the fact that during a late epidemic of scarlet fever and diphtheria, the great majority of patients were found among those who had been subjected to this contaminated water influence; this feature was particularly well marked in the country where dwellings are isolated and opportunities for accurate observation good. *I saw few cases of a severe type of the above diseases in localities where this influence was lacking.*

Fancy Creek sends this instructive account from Dr. H. Morrow: The only disease of importance in my neighborhood during the past year has been scarlet fever, the type of which was very virulent — so much so that one patient died in twenty-six hours after its invasion. *It was limited to two families, for I established strict quarantine, so strict that scarcely a neighbor could go to either house.** This outbreak occurred before harvest; no case had been in the neighborhood for five or six months previously. During harvest we had typhus fever; five cases in one family, three in another, and in a third only one. Each of the two families last mentioned contracted the disease by contagion; in the first the patient had been bathing in a pool of dirty water, into which excreta from the stable had been poured. There is considerable ague on Pine river, though the head waters of that stream are remarkably free from malarial disease. All inflammatory diseases in that region of course take on an intermittent type. Our school houses are generally too small, and their privies, once built, receive very little attention.

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*The recommendations made by Dr. Rector were all good, the last being particularly commendable.

From *Fountain City* Dr. Seiler writes briefly: An epidemic of diphtheria has prevailed in the northern part of this county, with many deaths. We have had many scattered cases of scarlet fever, measles and diphtheria here, but no epidemic.

From *Geneva* Dr. G. E. Catlin forwards the following interesting statement: In this section of country, embracing a radius of ten miles from this place, there has been but little more sickness than usual, with the exception of an outbreak of diphtheria, which has raged in this village since the 15th of May, ult. Remittent-bilious has been the prevailing type of fever, but to no great extent; there have been very few cases of intermittents, much less pneumonia than usual, and very few cases of typhoid type. Catarrh and bronchitis have prevailed, but we have little trouble from bowel complaints this summer.

In December and January last, there were about forty cases of diphtheria; all recovered with one exception, but many were greatly prostrated and recovered very slowly. On May 15, 1879, very unexpectedly, diphtheria of a most malignant type made its appearance in all parts of the village; three died within the week, and our village has not been free from the disease for more than a few days at a time from that date to this (Sept. 1, '79). I think in all there have been about one hundred and twenty-five cases of well-marked diphtheria, with eleven deaths, in this village since May 15, and many other cases of mild form.

I think the cause of this fearful outbreak and loss of life can be traced to filth and bad well water. By neglect in cleaning streets, back yards and barn-yards of manure and garbage accumulated through the winter, the well water used by the majority of our people is easily poisoned; our soil consists of about three feet of loam and clay, then a stratum of gravel six feet thick, and then the drift; through this porous mass drainings of privy vaults, barnyards and slop vaults, which are generally in close proximity to the wells, leach into the wells. I have examined many wells that are mere holes dug in the ground from twelve to thirty feet deep, curbed with pine boards in a state of decay, with barn-yards, cesspools — worst of all, privy vaults, within from ten to forty feet of the wells; and *I have noticed that in such localities our cases of diphtheria have been most malignant and the mortality the greatest.*

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* An excellent example.—SEC.

I find a source of great danger to the health of our people in little villages where there is no system of sewerage or drainage, where the house and barn are crowded close together, where the ground becomes saturated with drainage from barn yards, slops and vaults, and where the wells act as common sewers for the whole. The most malignant cases of diphtheria, and the only cases of scarlet fever we have had this summer, were in a fractional half block joining the lake where eight small one-and-a-half story buildings stand; the lots being short, the houses and barns were brought close together, and in these barns there are kept year after year forty horses, five cows and several hogs. *In this small space are seven wells*, two driven, the rest curbed with wood; all are within from ten to sixty feet of stables, vaults and dung-heaps. In this half block there have been ten cases of diphtheria, with four deaths, all four of which occurred within four days of the attack; there were also two severe cases of scarlet fever. I think these wells unfit for use, as the soil around them must be completely saturated with poisonous matter. I find it almost impossible to make people believe that *their* well-water can be impure from the drainage of vaults and stables, even when these are within twenty feet of the wells.

I am inclined to think that the public school in this place was the focal point of this outbreak of diphtheria. The privy vaults were in a most filthy condition, and the well was only sixty feet distant from them, thirty-five feet deep and curbed only with pine boards. Upwards of four hundred children attend school here nine months of each year. *As the first cases were all school children, and as the disease appeared in all parts of the village at the same time, its origin in the school certainly seems probable.* Many children were taken out of school, and the vaults were immediately disinfected, which action probably prevented a much greater mortality.

Another instance in which I was convinced that filth and bad water were the causes of five most malignant cases of diphtheria, was one in which a school-boy was first taken sick and died. I found that the cellar had not been opened and aired in several months, that there was in it a foot of water covered with a thick scum, that the well was only four feet deep, full of surface water, that the yard was covered with slops and garbage of all kinds, and *no other building* within four hundred feet.

Communications from Special Correspondents.

From *Geneva Lake* we have the following report by Dr. B. O. Reynolds: Our village has enjoyed its usual freedom from epidemic diseases during the past year, with the exception of diphtheria. During May and June we had something over a hundred cases of that malady; few, if any, were malignant in character, but many were severe, and ten proved fatal.

Our village is situated at the outlet of Geneva Lake, on a gently sloping plateau from fifteen to forty feet above the surface of the lake. The water-supply is from wells, generally curbed with stone and sunk to the lake level; the first six or eight feet is composed of clay mixed with gravel, then we come to a clean, white, sharp sand, which continues until the lake level is reached, when an abundance of water flows in. Where no surface drainage is permitted to enter, the water is excellent, Heisch's and other tests showing it to be very pure. In no case where they suffered from diphtheria did I find the water impure; in several cases where the disease appeared most malignant and fatal, it could not be traced to contagion, and only the best sanitary conditions could be discovered. In one instance where six cases occurred in one family, one proving fatal, it seemed to all human appearance that the sanitary conditions could not be improved; a fine, large house, situated on high, dry land, well elevated upon a stone foundation, large, well ventilated rooms, good water, no local filth, no privy vault near, no barn-yards, hog-pens, or other foul places, robust, hearty children, well fed, well clothed and well cared for. This family suffered severely, and no contagion could be traced in connection with the first child attacked, and no other case occurred in the immediate neighborhood. On the other hand many families escaped or had the disease lightly, where everything in a sanitary point of view was most wretched.

While I have no doubt that this disorder, like many others, is favored in its development and malignancy by filth, dampness, impure water, and air impregnated with the emanations from sewers, privies and other collections of putrefactive matter, I am yet convinced that its prime cause or causes are still hidden from our view, and physicians and sanitarians must continue the search before its sources and lurking places can be thoroughly understood and effective measures taken for its prevention.

Georgetown reports as follows through Dr. J. Oettiker: Last fall there was considerable malaria among those who lived on the bottoms and along the courses of the larger streams, with occasionally a case in better favored localities. With respect to other diseases, none have prevailed to any extent except bowel complaints and typhoid fever. Cholera morbus seems to have been quite severe this summer, being partly due, I think, to the unusually sudden changes in temperature, some days being extremely hot while the nights were cool, the thermometer almost falling to the freezing point.

Typhoid fever has been quite prevalent this summer. All the cases coming under my notice have originated in families living in one ravine, who are as cleanly and well to do as those of the surrounding country, and, as far as I have made any observations, the water supply seems pure, and other matters of hygiene have received due attention. There is one cause or condition, however, that may account for the whole trouble; about half a mile below where most of the families who were afflicted live, is a mill-dam nearly filled with mud and matter washed down during the last few years from the country above; since this dam was built there has been more typhoid fever in the vicinity than ever before. It would seem as if there should also be more malarial disease; but I saw only two cases in the neighborhood last year.

From *Greenwood* comes the following from the pen of Dr. H. J. Thomas: The past summer has been a healthy season; no typhoid and but few cases of intermittent fever; those that did occur were among a crew of men at work on what is known as Hemlock Dam on Black river. This dam was built last fall, flooding about two hundred acres of low land; it was constructed for logging purposes, and in that service is drained dry, or nearly so, quite frequently, remaining dry for a week or more at a time, and at such times miasma must be given off. Scarlet fever went through this section very thoroughly last fall and winter, and there have been occasional cases — mild in type — through the summer. There has been no summer complaint this season that was not easily checked, and no deaths from any disease of that nature. The settlers here are generally supplied with water of good quality from wells. School houses here are large, but *crowded full* in winter; heated by stoves at one end of the room so that the temperature is not very even; the children are generally healthy, however.

From *Hartford* Dr. E. M. Rogers forwards this report: We have had no special malarial disease in this town lately. Typhoid fever has been with us during the past year. About a year ago a lady in the town of Addison was attacked by this disease; the house in which she lived was in close proximity to a water closet, which emitted a very bad odor. The whole family suffered from the malady, and then occurred no less than eighteen cases in the town, in every one of which I can trace exposure to the disorder in the cases of the family first attacked. During the existence of the fever in this family, quite a large number of men were engaged in threshing on the premises, seven of whom contracted the disease. The excreta from the first patient were thrown upon the ground, without covering, near where these men were at work, and to this carelessness, in my opinion, was due the spread of the disorder. Typhoid made its appearance in this village about two weeks ago, the first patient being a boy of sixteen, previously in good health. He had been working in a barn during the summer, and was the only person who had remained in the building for any length of time; there was a privy built against the barn, the effluvia from which were very offensive, and I have no doubt that the cause of the fever in this case was the continued exposure to the exhalations from the privy vault.

From *Hazel Green* Dr. K. Kitloe writes: There is nothing of special interest to report for the past year. Four cases of scarlet fever occurred in Cuba City some months ago, obviously from want of care in isolation, and I had two cases of diphtheria. I notified the principal of the public school to prevent further mischief.

Independence sends the following report by Dr. W. R. Allen: The population of this town is largely foreign; the general occupations are agricultural. Diphtheria has prevailed to an alarming extent, chiefly among children, but not entirely so. No adult has died, nor has any child over ten years old. In the majority of cases, the houses of those attacked were unfavorably situated on low ground, with poor drainage or none at all; other important factors are bad water, and in many families uncleanly habits. Bilious and typhoid fever have been unusually prevalent, especially among the foreign element of the population, and there was considerable dysentery in the spring. Want of cleanliness, irregular and unwholesome diet, bad cooking and intemperance, I find are the strongest allies of disease.

From *Kilbourn City* comes the following encouraging word from Dr. G. W. Jenkins: There is a general waking up to the importance of paying more attention to all those conditions which conduce to the well being and surroundings of home. Families who have heretofore been in the habit of using contaminated cistern water, and that from wells which drew their supplies almost wholly from the surface, are filtering the cistern water and sinking wells into the rock, and paying more attention to all the conditions that go to make home clean and its surroundings healthy. But there is yet great room for improvement in this respect; for instance, during the early part of last spring, after the frost left the ground, a number of families suffered from derangement of the digestive system, followed by severe vomiting and diarrhœa with great prostration, and in some cases, bloody passages from the bowels, though there was but little febrile action. In every case that I saw, the cause of the trouble could be clearly traced to the use of impure water from the wells, some of which were contaminated from the barn yards, others from the surface water, and others still from slops thrown out near them, they being too near the kitchen door. Yet others had rotten curbing, the planks composing it not having been renewed for years. To make them understand the danger, it was needful to *test* the water; the mere assertion that it was impure did not satisfy them, but when they received some ocular demonstration of the fact, they were convinced and generally took steps to obtain pure water.

There is no doubt that many of the school houses in the rural districts are sadly in need of proper means for warming and ventilating. Many cases of sickness have their origin there.

From *Leeds* Dr. J. Faerber writes thus: Our town is generally healthy, without any local cause of disease; the people are in moderately good circumstances generally, try to keep their homes clean and comfortable, and are not given to any excess in drinking, The only contagious disease we have had this year was measles, which affected the children of one school district, and the origin of which was clearly traced to a school-boy who came in contact with a family in a neighboring town in which this disease prevailed; this lad communicated the disorder to the other children even before the eruption had appeared on himself.

In the town of Windsor, just south of this, there is a local cause of disease in the shape of a small creek, which runs from the north line of that town in a southwesterly direction. In summer it is almost dry, and foul stagnant water accumulates in the deeper parts of its bed; the families, mostly Norwegians, living along its course, are much more liable to sickness than are their neighbors who live further off; no autumn passes without the occurrence of some cases of typhoid or intermittent fever.

From *Lomira*, Dr. H. P. Wenzel sends a communication which is partly given elsewhere; the remainder is as follows: Sickness has been more prevalent than last year. Infantile diarrhœa, cholera morbus and typhoid fever are all very severe and sudden in attack, producing great prostration. There have been three cases each of scarlet fever and measles, and about ten of diphtheria, in this vicinity; whooping cough also prevails to some extent, but is mild in type. Chest diseases were very prevalent during last winter, and I had three well marked cases of diphtheritic bronchitis in my own practice. Tonsilitis was very frequent, and rheumatism and periosteal troubles more than usual. Little, if any, malarial disease is known.

General and local sanitary conditions are deplorable; the public at large, and individual citizens, with few exceptions, are alike indifferent to cleanliness in the proper acceptation of the word, and putrefaction with the consequent infiltration of the soil goes on unchecked and unrestrained. There should be a strict law passed to reach villages, which are proverbially filthy; the streets are full of manure and other filth, the yards send forth foul odors from the refuse of kitchens, wash-rooms, etc., and the effluvia from privies are terrific. There should also be a statute to protect the streams of the state from needless pollution by manure, vaults and slaughter houses; any one passing down Rock river, for example, will find *dead animals in* the water, and privies, manure heaps and slaughter houses along the banks; thus, not only is the water rendered unfit for man or beast to use, but its native inhabitants, the finny tribes, are driven out.

From *Martinville*, this report comes from Dr. F. D. Stanard: The general health of our town for the last year has been tolerably good; there have been a few cases of sore throat, which the people called diphtheria, but none of the genuine kind. Malarious diseases have prevailed to some extent in the valleys through which streams run, especially those in which they can be swollen by heavy rains, and made to overflow the bottom lands; agues and bilious fevers have predominated, the latter much more violent and harder to control. Typhoid conditions have been developed in a few cases lately, mostly owing to uncleanliness, filth in the cellars, especially decaying vegetables, etc.

I believe that the sanitary conditions of our public schools, especially those connected with warming and ventilation, give rise to a great many bronchial affections, and I am sorry to say that these faulty conditions obtain to a very great extent with us. Pulmonary diseases have been increasing in this locality within a few years. Sanitary conditions in rural districts are hard to control or regulate, and efforts made by the health officer meet with frequent repulses, as though he were interfering with matters that were none of his business; still all the sick wish to get well. Our efforts here have been directed to the enforcement of strict sanitary measures, and among the more intelligent portion of the people we have partially succeeded.

From *New Lisbon*, we learn through E. H. Townsend that there has been no contagious disease, with the exception of a few cases of scarlet fever of a mild type. The sanitary condition of the village is fair, with the exception of that of the northeast portion, where fever, typho malarial in character, prevails; the low state of the water in the mill-ponds on the Lemonweir river exposes a large extent of decaying vegetable matter. Near Werner, there has been a good deal of malarial fever from the same cause. The summer diarrhœas of children have been quite fatal.

From *New Richmond*, Dr. O. N. Murdock sends this instructive communication: Typhoid fever has occurred here to some extent, the cases with two exceptions only, appearing in one locality in which the wells were fed from the wide-spread above the dam on the Willow river at this place. Just below the outbreak, the flood gates had been opened and water drawn off so that the rank vegetation decayed, and at the same time considerable animal matter was exposed to the action of the sun and air. Now mark — when the water was drawn off, the wells became dry, and when the flood gates were closed, the water rose slowly in them, tinctured, of course, with the products of decay until they were filled. Those using this water, complained of its tasting and smelling badly. Typhoid fever followed.

Measles was introduced by a gentleman who was traveling west from New York; he was exposed in Michigan, and was prostrated here with the disease, communicating it to some children, who, in turn, attended school and scattered the disease through every household where there was anyone liable to be attacked. There have been some cases of diphtheria and whooping cough, but how they originated I do not know; also some cases of mumps, in which metastasis took place very generally, thus making the disease worthy of notice.

In addition to all, these two peculiar epidemics appeared here during the months of June and July, one of which I called pleurodynia, occurring in persons between ten and fifty years old, the other gastrodynia, occurring in persons between one and ten years old. The extent of these must have been considerable, as I treated more than seventy-five cases of the former and probably about thirty-five cases of the latter; other physicians also had a good many; both yielded readily to treatment.

I think our village has never been in a better sanitary state than at the present time. Two years ago, we, as a health board, had some difficulty in enforcing cleanliness, but this last spring everybody seemed to take pride in "slicking up" his premises and putting them in a good sanitary condition; few suggestions on my part have been necessary.

I think I am safe in saying that our new school building cannot be excelled in the state, as far as location and construction are concerned; it is very commodious and well ventilated, and from first to last we had the health and comfort of its prospective occupants in view. I think that with our present knowledge on the subject, it is as nearly a model as we can approach.

From *Ontario* we have this pointed and thoroughly practical communication from Dr. H. P. Miller: The amount of sickness in this locality for the year has been more than usually of the zymotic type, embracing cases of diphtheria, scarlatina, measles, whooping cough, typhoid pneumonia, typhoid, intermittent and remittent fevers, and cholera infantum.

I was called in to see a family that was suffering from diphtheria in its most malignant type, four deaths occurring out of eight cases. On examining the premises and their location, I found that the house stood in a low valley, on damp ground, with the barn and hog-pen close by. It was built, moreover, directly on the ground, without wall or underpinning; the cellar, a hole dug in the ground, was damp and filthy with vegetables, which had been left over from the winter, and was, of course, wholly unventilated. Slops had been thrown out at the doors all around, and left there *to ferment* and stink, and *this family, numbering ten individuals, was living in the midst of all this filth in one room sixteen by* *eighteen feet*, violating every law of hygiene and right living in the worst possible way.

Upon the death of the first patient, in spite of all that I could do or say, *they left the child's body in the bed where he died, in the room where they were all living, and sent for two daughters*, the one aged sixteen, the other eighteen, who were working out, and had them come home. Nothing that I could urge availed to stop them, and as a consequence, in the inevitable course of human events, these two young ladies both sickened and died within eight days, and with them death claimed yet another victim, making four deaths in all out of eight cases.

In the name of the Infinite Being, how could any one expect them to live when the laws of health were thus violated. Cleanliness is godliness, and they who outrage it thus, and break all the laws of the body, must expect to suffer the penalty.

I was called to another place where they were suffering with typhoid fever of a very severe type. On examination, the premises here showed the following state of affairs: This house also was built directly on the ground without wall or underpinning beneath it, and during the fall preceding the fever, had been banked up with dirt to keep the frost from reaching the cellar. On entering this cellar, it was found to be damp and foul from decaying vegetables which had been stored there nearly a year before and never removed. But this was not all; outside of the house to the east was a slough, on two sides of which stood barns, on a third side the privy, and on the fourth and west side they had dug a well and were drinking the water. Two of this family died, and I have little doubt that the water and the bad sanitary condition of the premises were the causes of the severe type of the disease.

The sanitary condition of this village is not very good; the cellars are damp, and privies, barns, etc., are too close to the wells. To learn sanitary and hygienic laws seems to be the hardest task that can be undertaken by humanity; the human mind takes in politics and [so called] religion with avidity, but manifests a stubborn aversion to [that portion of religion embodied in] the laws of healthy living.

From *Oxford* we have this by Dr. A. G. Stoddard: Bowel disorders have prevailed to an extent unequaled hereabouts since I became familiar with this locality — now about five years ago — and have been unusually dysenteric in their character. Fewer cases of typhoid than last year; the prevailing type of fevers is intermittent, and this is especially the case along the margin of Buffalo lake and adjacent portions of the Fox river; all the cases I have seen were quotidian. The protracted dry season, extending as it did throughout the two later summer months, is no doubt responsible for all the diseases enumerated in a great degree; I have never seen so little water on the surface of our marshes; the peculiar odor of decaying vegetable matter has been very noticeable. A large percentage of ague has occurred among the farmers who made hay on these marshes. Few children have escaped whooping cough, and measles has prevailed to a nearly equal extent.

From *Peshtigo* Dr. L. J. Smith makes report thus: Public health has been good generally in this vicinity during the last year. We had a few cases of intermittent fever in August and September, which was unusual for this place. Last winter we had whooping cough, but not as a severe epidemic; we always have sporadic cases of diphtheria, but there has been no general prevalence of the disease; the same thing may be said of typhoid fever, which has been modified in most cases this fall by malarial influences.

Scarlet fever was introduced into the "sugar bush" by camp-meeting; its type was mild and it did not extend beyond a few families. The drainage of this village is bad, and surface water is the standard drink.

As to school accommodations in this place, the primary department has on its roll, under charge of one teacher, 98 names, with an average attendance of from 85 to 90. The scholars have been *packed* three on a seat, stowed away on the teacher's dais, on wood-boxes, etc. A new school-house, however, is nearly completed, which will contain two fine rooms of ample dimensions, together with fair sized ante-rooms.

From *Platteville* we have the following from Dr. G. E. Robertson: There is very little to report as to the sanitary condition of our town; there has been no prevailing epidemic during the past twelve months — some bilious disease, some intermittent fever, cases of diarrhœa and dysentery, with very little mortality from any cause hereabouts. There is no formidable nuisance existing here that is calculated to originate sickness. The village is in a better sanitary condition than it was last year; I find no disagreeable emanations from hog-pens, privy-vaults, etc., as there were then.

The sanitary condition of our schools is very good. The attendance of children at too early an age is an evil in most schools; some parents send their little ones to school to give the teacher the trouble of nursing them, instead of taking it themselves; others send them from vanity, that they may be able to boast of early progress, and if the unfortunate youngsters live to graduate, they have no constitutions; but how can it be remedied?

From *Racine* Prof. R. C. Hindley makes the following suggestions: In this city probably not more than one-fifth of the houses are connected with sewers; the rest have cess-pools which are really nothing more than holes in the ground, with covers over them, and, as a rule, are from ten to thirty feet distant from the wells which supply drinking water. I suppose that we are no worse off in this respect than the majority of small cities and towns in the state, but in thinking over the matter, I have come to the conclusion that the legislative authorities of the state should compel every man having a house, whose water-closet is not connected with a sewer, to make the vault or cesspool water-tight by cement; it seems to me that, could this be done, it would obviate to a great extent the dangers connected with the present method.

Several cases of sickness have come under my notice, caused by inhaling the fumes of oil of turpentine, and various other solvents used in the manufacture of varnishes, together with the dust of so-called "bronze powder." These persons were employed in "finishing," *i. e.*, in varnishing, bronzing, etc., light articles of hardware made in a factory here. I think it quite probable that if a committee of the State Board of Health were to give attention to unhealthy trades and operations as at present carried on, facts would be obtained sufficient to warrant the dissemination of information on the subject, and perhaps also the obtaining of such legislation as England already has.

From *Reedsburg* we have the following account of an epidemic of scarlet fever by Dr. C. A. Rood: Scarlatina broke out in this place in January, 1879, making its first appearance in the town of Westfield, cornering southeasterly upon this town, quickly assuming an epidemic form, most of the cases being malignant in type. It spread very rapidly, and was soon in our midst, taking off children of all ages from the cradle to sixteen years old, by the score; many succumbed under the violence of its attacks in from twenty-four to seventy-two hours, others resisting for a week or ten days. During the first month or six weeks of its ravages, the disease was confined almost exclusively to German families, and I had begun to hope that the American portion of our population — at least the families who paid some attention to proper household hygiene — would be comparatively free; suddenly, however, the deadly work began among them also, and the very first case proved fatal, the disorder lasting, I believe, only thirty-six hours. From this on it seemed to attack all nationalities indiscriminately. After the weather began to grow warmer, the violence of the malady, as well as the number of cases, began to abate; but at no time up to the present (August, '79) have we been entirely free from it.

The brain and nervous system seemed to be so violently affected from the first that, in a great many cases, the disease manifested itself by convulsions, followed by coma and death. How and why was it that this epidemic was at first confined to one nationality? Was it by reason of their mode of living, and their inexcusably poor knowledge of general hygiene? And was it because of the impregnation of the air with a specific poison by means of carelessness or ignorance, that the malady raged with such violence that all within its reach were inoculated even though they lived well, and under strict hygienic management?

We are now having a great deal of sickness among both young and old, mainly dysentery, entero-colitis and diphtheria. The sanitary condition of our town I deem very unsatisfactory; we have a large body of water in our midst, and a great number of shallow pools of stagnant water along its borders, which breed malaria whose effects are manifested in agues and bilious fevers. Our back alleys are in a poor condition; privies, with and without vaults, pig pens and wells from which people get their supplies of drinking water, are all crowded together, and slops and refuse matter are thrown out and left to decay wherever they may fall, and add their share to the atmospheric poison.

[It would seem almost useless to answer the questions propounded as to the causes of special malignancy and general prevalence of scarlet fever. The account with which the above communication ends, probably contains the solution of a very large portion of the problem. — SEC.]

From *Retreat* Dr. S. A. Mellen writes briefly thus: We have had no epidemics during the year. Our share of malaria is above the average, but we have had no deaths to charge to its account, and it has been generally mild in form. Our school-houses are usually large enough for the number of scholars and are ventilated well enough, *except* on the coldest days, *when they have to keep the windows closed.*

From *Richfield* we have the following from Dr. D. W. Lynch: Typhoid fever made its appearance in the town of Addison, in July, '78, and ran on until January, '79, there being in all about forty cases, of which ten proved fatal. Very many of those who contracted the disease had been in communication in some way with the house where it first appeared, and where six cases proved fatal out of a total of eight.

Diphtheria was imported from Milwaukee, in July, two children in one family being attacked, and both dying. It appeared again spontaneously in my practice in November, with one death in five cases.

About February 1st, influenza appeared in my locality, attacking every one in a greater or less degree; few deaths resulted from it, those that did occur being in the cases of infants or very old people; it lasted only three months from the time of its first appearance.

Measles made its appearance at about the same time with influenza; it started in the western part of my district and made rapid strides toward the east, taking in its course every susceptible subject. No deaths were due to it in my knowledge, though there were nearly two hundred cases within a radius of eight miles.

From *Watertown* Dr. R. M. Wigginton reports as follows: Diphtheria made its appearance among us in October, but in a mild form, and has remained with us in an up-and-down sort of fashion ever since, now seeming almost to die out, and again springing up in a new place. Much care has been exercised by physicians and teachers in stopping its spread, otherwise it might have been very bad. Of course, in many cases its origin could be distinctly traced to some form of contamination; but in one instance where a whole family of children was attacked, one death resulting, the cause, no doubt, was decaying vegetables in the cellar, and a couple of feet of water remaining for two months on the same. The odor was characteristic, and there were spores, slime and dripping dampness from the joists below. There were no other cases in the neighborhood. Although the origin in this case was doubtless in this way, I am of opinion that the great majority of cases result from contact and from the mingling of sick and well.

From *Waunakee* Dr. J. Howard writes: Diphtheria has prevailed here for many months past, and I have noticed that in those families who paid strict attention to hygiene, and whose buildings were in a good sanitary condition, the death rate has been small when compared with those whose sanitary condition was bad. In one family, a few miles from here, three children died, and, in my opinion, the life of a fourth was saved only by its removal to a better sanitary atmosphere. Under this house was a *hole* eight feet square, filled with stagnant stinking water, the poisonous exhalations from which had no escape except upward through the living rooms. An immediate neighbor, the sanitary condition of whose house was much better, also had four children sick with the disease, but all recovered. Among the deaths in cases which followed, there were two young women. The sanitary condition of this village has not been good.

From *Waverly* Dr. M. C. Thompson makes report: Many cases of diphtheria have occurred among the Norwegians in an adjacent town, the mortality being considerable. I ascertained that in almost every case the disease appeared in log-houses utterly destitute of any ventilation, with cellars in a very bad condition, containing vegetables in a state of decay, while the rooms above were kept at fever heat.

School houses in this locality are very poor. I know of only one which is properly furnished. Most of them are miserable log-houses.

From *West Depere* Dr. H. H. Hurd writes as follows: My report must necessarily be imperfect, because of the fact that there are no records from which information can be drawn. I am keeping such records myself, and hope to induce others to do the same, in order that more accurate reports may be made in future.

The major part of the cases of diphtheria that came under my care were attended by such contamination of water supply, and such accumulation of filth, as made it necessary to change the water used, and to remove offending matters. I am unable to give any particulars except in one case, where there was slight fever with diarrhœa, that resisted remedies, until a change made in the water used put a stop to the difficulty. On examination the water showed considerable organic matter, but on the removal of decayed plank curbing, and a thorough cleaning of the well, this disappeared.

From *Wilson* the following brief report is made: There have been some cases of cerebro-spinal meningitis here, with two deaths; the disease was not traceable to any local cause so far as known.

From *Wonewoc* we have the following from Dr. J. E. Smith: Typhoid fever is sometimes frequent, and is, in my opinion, caused by the water used for drinking purposes and general uncleanliness about premises and persons. The water is generally derived from springs, and many have a most pernicious habit of hauling it in barrels, which are allowed to stand uncovered about the houses till emptied — usually a period of two or three days. It may easily be conceived what the condition of the water is at the end of that time. I frequently warn people against the practice; some heed the warning, but many pay no attention to it at all.

[In connection with the foregoing communications from special correspondents, we present the following

COMMUNICATIONS FROM CLERKS OF LOCAL HEALTH BOARDS,

in which will be found some interesting facts which go far toward explaining the prevalence of disease in the localities referred to. We have to thank these officers also for very many communications and suggestions which have been of service to the State Board of Health in the prosecution of its work.

SEC. S. B. H.]

From *Clarno:* The average distance of privies from water supply cannot be readily ascertained. With one exception it is believed, however, that none are near enough to do any harm, or prove a source of disease. The exception noted is one in which a privy is built directly over a spring branch, which empties into a stream of water that supplies several families. Some two years ago all the members of one of these families were stricken with typhoid fever, the origin of which, though not clearly traceable, was attributed by many to the water thus contaminated.

From *Kingston:* In regard to the principal source of danger to the health of our citizens, I should say that it was impurity of water supply from the leaching of barnyards, manure heaps, etc., into the wells. Our wells, for convenience sake, are, in many cases, *in too close* proximity to the houses, barns, etc. Another cause of ill-health is excessive toil in hot weather, under the blazing sun, upon a diet which often consists of "cookies," cakes, fried pork and the like. There are many within my own knowledge who, for convenience of stock raising and water supply, live and have lived for many years on the margin of the marshes hereabouts, not more than six or eight feet above the level of the marsh, who have never been visited by any sickness worth mentioning, and seem to enjoy good health generally. I attribute this to the good natural drainage of the uplands, and to the constitutional vigor possessed by most of the foreign population, which enables them for a long time to ward off the attacks of disease, for, most assuredly, "the healthfulness is due to other causes than the intelligent pains taken to secure it."

From *Luck:* Some of the sickness here, I believe, has been produced by filth; many houses have no privies attached to them, and manure piles and stables are often too close to the dwellings. Although the houses as a general thing are kept neat and clean, yet in summer the odors arising from the dung-heaps, cattle yards, etc., are very offensive and must be unhealthy.

In my judgment, the principal sources of danger to health are, 1st, the absence of privies from many houses; filth which should find a place there being deposited in many unsuitable places. 2d. The character of the water used by many. A large number of clear springs are to be found, but as a matter of convenience, many obtain water from creeks, swamps, etc., or dig shallow wells in low places where the water soon becomes brackish. Every one can obtain good, pure water, if he will take the trouble, but *many use the poor quality as a matter of economy*. A shallow well such as is referred to above, can be dug at a cost of five or ten dollars, while a well sufficiently deep to secure good water at all times, and properly constructed otherwise, will cost from twenty to forty dollars. 3d. There is a large amount of swamp land hereabouts, the malaria from some of which must be decidedly injurious to the people in its neighborhood.

These three causes must in time produce their effects, if indeed they have not done so to some extent already; should an epidemic break out among us, it will find a proper field for development unless matters are greatly improved.

From *Lemonweir:* I am of opinion that much sickness is caused here by damp cellars under the apartments occupied as ordinary living rooms. In the fall, moreover, these cellars are crammed full of vegetables of all kinds, for winter use, and very few are cleaned out in spring, or at any other season. The atmosphere above them can hardly be called a salubrious one.

From *Monroe:* Early in the spring of '78, a girl 15 years old died of diphtheria in this place, but we had no other cases until some time in September following, when a boy aged ten or twelve died from the same disease. After this, about forty severe cases occurred, ten of which proved fatal; in addition, there were many other cases which the physicians called simple sore throat. All the deaths occurred in an area of forty acres, in the middle and the southeast parts of the town. In October, the public school, where some were inclined to place the cause of the trouble, was closed for a week.

Our public school building was erected in 1869. A privy having a large vault was constructed in the basement, and was thought a great improvement on the usual style; the odor from this privy, however, extended and penetrated into every room, being generally unperceived by those who were habitually in the building, but very perceptible to strangers and visitors. The board of education fearing that it would produce sickness, had it thoroughly cleaned out in July or August, the whole thing being washed, the walls plastered over with lime, the vault filled to a depth of two or three feet with fine, dry earth, and a new tight floor laid over the whole. A new privy was built out doors, and the use of the other wholly discontinued. Although the old vault had been thus thoroughly cleaned and rendered tight, an unpleasant odor was yet perceptible on entering the building; thinking this might proceed from the old flooring, which was saturated with urine, we took it all up and replaced it with new double planking, with tarred paper between the layers to prevent any escape of gases; and having done this, we are satisfied with the condition of the house. Carbolic acid was also freely used in and around the various rooms, though many considered this of little practical use. The disease raged among the small school children from some time in September, 1878, till January, 1879, the last death occurring December 17, 1878. The fatal cases were confined to a limited number of families, about thirty in all, whose children attended school in the building described; none were fatal among the children attending other schools.

I have thus given you all the *facts* connected with this outbreak. *Theories* concerning it were abundant; some believed its origin to be decaying leaves, as it was most violent just after the leaves had fallen, and the season was wet; others maintained that the water of our wells was in fault; the wells were much fuller than usual, by reason of the abundant rains; others still charge the whole thing to the privy vault in the school house. I believe that all these may have been factors in producing the disease.

From *Orion:* In April last I called the attention of the board of supervisors to the duty of making and publishing an order requiring citizens to bury dead animals and similar sources of filth, and make such other arrangements as were necessary for the preservation of public health. Such an order was promptly made and will be enforced whenever and wherever it is needful.

With the exception of fever and ague the health of this town *has been good* during the year. Along the Wisconsin river there are many sloughs and bayous which hold water during the entire year, but become very filthy and stagnant by the middle of August unless much rain falls, and so continue until the middle of September. This state of things may continue without producing any noticeable change in public health, but when under these circumstances, a peculiar mould — for I know no better name for it — makes its appearance, in small patches on the beaten roads, in door yards and on paths, seeming to have sprung up in the night, fever and ague certainly follows within two or three days, appearing in every family along the river and affecting domestic animals, even cats and dogs. (I have heard of one dog that had a chill daily!) More than this — should no rain fall and this "mould" increase in quantity, fevers are very apt to assume a typhoid character.

There are doubtless many who will question these facts, but I have observed them now regularly for a period of nearly forty years, and whenever I have seen this "mould," I have taken precautions against ague, thus far with success. Observe that I do not claim that the plant, fungus, or whatever it may be, *produces* fever and ague, but that its presence is an indication of some condition which will cause the disease I am convinced. Should heavy rains fall within the time named above, no chill follow.

From *Packwaukee:* Measles, though in a mild form, has had a pretty extensive run here during the winter and spring, being most severe in the months of March and April. It originated thus: a lady traveled through Michigan with her little daughter, who contracted the disease somewhere *en route;* she attended a public meeting here, and from that assembly measles were spread through this and the adjoining towns, taking four out of five of all who were susceptible.

From *Preston:* Our locality is generally healthy, and our water supply good. Contagious diseases have not been frequent in occurrence, diphtheria being the only one that has prevailed to any extent. Last winter, typhoid fever broke out in one part of the town, but medical advice was promptly had, and the directions given for its prevention proved efficient, so that it spread no further. No deaths occurred. Our population is, I think, up to the average in cleanliness, etc., but there is abundant room for improvement.

From *Remington:* Diphtheria is the most prevalent disease hereabouts; it is undoubtedly due, in large measure, to the use of bad water for drinking purposes. All the wells in this locality derive their water from the marshes and swamps which abound in the vicinity; the water filters through the quicksands without being freed from the decaying matter with which it is impregnated.

From *Trimbelle:* We have had considerable diphtheria during the past winter; it commenced in the southeast part of the town, and thence seemed to spread, though most of the cases occurred in that district. One of my neighbors had all his children, three in number, down with it at the same time; two died. The drinking water on the premises was obtained from a spring which oozes out of the sand at the edge of a small stream below the stables. The flavor of this water was very unpleasant; if it were allowed to stand and become a little warm before using, it was totally undrinkable.

From *West Lima:* There has been much sickness here, among children especially, during the last spring; you can judge for yourself whether local causes had anything to do with producing it, from the following statement of facts: The streets are in a most deplorable condition; in many cases miserable pig-pens are maintained within ten feet of dwelling houses, and wells are in constant use which are close by where all the litter of the stables and barnyards is deposited. You may draw your own inferences

From ———:* There has been one case of typhoid fever here, occurring in a family of very uncleanly habits. Their well, though reputed to be one of the best in the town, had been in constant use for more than twenty years without having been once cleaned out in that length of time. Nor was this all. For fifteen years they had been in the habit of throwing all slops out upon the ground, at a point where the slope was toward the well, and in its immediate vicinity. The only wonder was that they escaped disease for so long a time. Since then the well has been cleaned out, and now they bid fair to be as free from sickness as are most of their neighbors.

My own family was living in a logging shanty in a pine forest where the ground was high and the surroundings generally good. In August, however, our well gave out and we took to using swamp water; as a result, every one of the family, myself excepted, contracted disease. I was absent from home during a great part of the time, or probably should have been sick also. Our nearest neighbors, living half a mile off, a family numbering ten members, also suffered from fever, nine persons being attacked. Their barn was situated about fifty feet from the house, the well being between the house and barn. Water stood in the cellar directly under their living room, the cellar being full in the spring and becoming dry only about August 1st, at which date the first case of fever appeared. In addition to water, the cellar contained a quantity of rotting cabbage and several bushels of potatoes in the same condition. I give only facts, from which you may draw your own conclusions.

I believe in the theory that bad water has more to do with originating and spreading diseases like diphtheria and typhoid fever than all other causes combined. I cannot account for the illness of my own family, in what I thought, and still think, a very healthy locality, upon any other supposition.

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*The writer of this important communication, while willing to have it printed, desired that no names should be given.

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